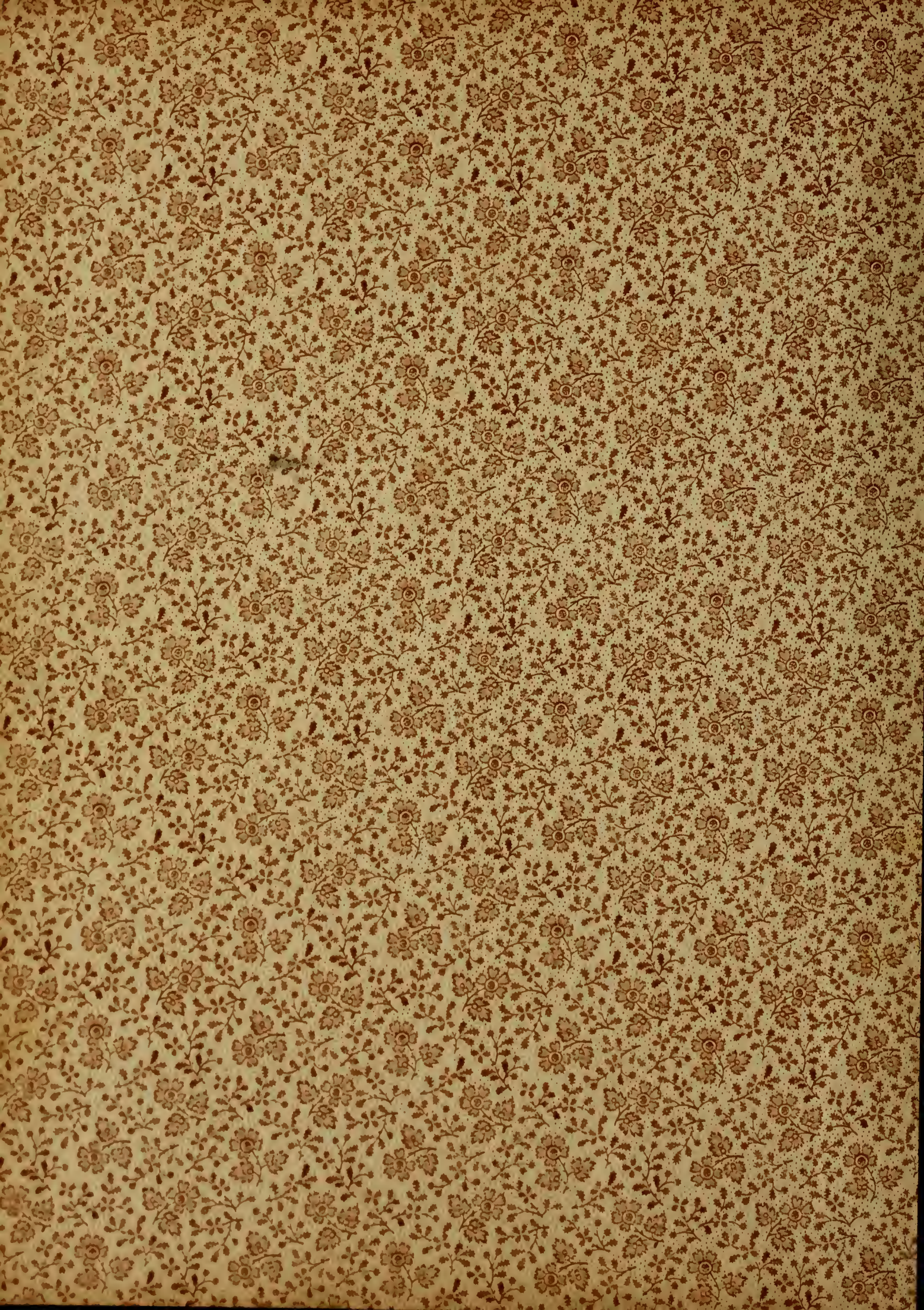




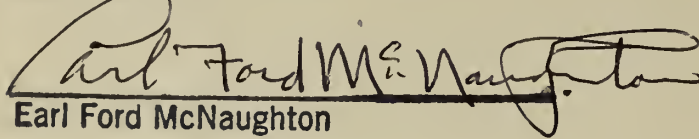
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1885-1892

Collection of Native North American Indian Books,
Historical Books, Atlases, plus other important au-
thors and family heirloom books.

As of 12-31-93

A handwritten signature in dark ink, reading "Earl Ford McNaughton". The signature is written in a cursive style with a large initial "E" and a long, sweeping underline that extends across the text.

Earl Ford McNaughton

John C. Boss

May 1, 1899.

G.B.R.

Dec. 1885

Nov. 1892

Dec. 84



THE CLAY-WORKER

VOL. IV.

INDIANAPOLIS, IND., DECEMBER, 1885.

No. 6.

Written for the Clay Worker:

POTTERY AMONG THE INDIANS.

BY GEO. S. TIFFANY.

"Then I went down to the Potters' house and behold he wrought a work on the wheels." (Jer. xviii, 3.)

The work on the wheel is so distinctly marked by horizontal parallel lines that it may be readily distinguished from any other kind of Potters Work.

The invention of the wheel may thus be traced beyond the era of written history by its work found among the materials that cover the ruins of the more mighty cities of old time. This is true only of the Eastern hemisphere. The wheel was unknown on this continent before the advent of the white man and even at this time very difficult pieces are formed by the Indians by the hand. A careful observation of their work in the American Museum at Washington and of the specimens exhibited at New Orleans Exhibition failed to discover the least trace of the work of the wheel, or of having been cast in moulds.

In the Western as well as the Eastern World the Potters Art may claim to be the most ancient. The Cliff Dwellers of New Mexico and Arizona, of whom we have no history—no knowledge except the ruins of their habitations and canals, had a knowledge of the art. About their ruined habitations are scattered quantities of broken pottery. "Skeletons have been exhumed and many large *'ollas'* filled with charred corn and beans". Occasionally a stone implement is found, but no metal instrument has yet been discovered. The discovery of such relics show that the fictile art originated in the "Stone Age". I once made the statement that our first parents could not have indulged in the luxury of a boiled dinner, until they had learned to make a clay pot. Among some tribes a rude vessel for cooking is formed by excavating a basin shaped hollow in a clayey soil; pugging the loose clay with their feet and plastering the surface. They allow it to dry and then build a fire in it so as to form an earthen-ware body. The water in the pot is kept hot

by means of stones heated in an adjoining fire and dropped into the vessel. This is probably the most antique earthen vessel. The first efforts no doubt, were to provide a vessel for holding water for cooking food. Thus the art became a domestic duty, performed among all savage tribes by the women. One cannot but admire many of their really beautiful designs, though rudely executed, and feel that under the favorable circumstances that surround the women artisans of the present day their work would not have been considered inferior.

The Indians had a knowledge of earthenware only—no specimen of glazed ware has been found. All their work is hand-work formed by a building up process—no wheels, no moulds. But we see in their rude work many of the designs that modern art has elaborately executed. In the heads of hooked-billed birds and in the legs and feet of animals, they found designs for handles and supports of vessels. A pretty conceit is shown in the work of the Panama Indians, in the supports of vessels. Just at their junction they are enlarged and made hollow, and through a slit may be seen pellets of burned clay—a birds nest. This conceit certainly sprung from an appreciation of the beautiful in Nature, which is the inspiration of Art.

In the department of Arizona at the New Orleans Exhibition were three large jars for cooling water; they were about sixteen inches in diameter and twenty inches high, made of a refractory clay—very light and porous. It struck me that they were much lighter than could be made upon a wheel and were symmetrical in form. How could they be made without plaster moulds?

From a small pamphlet distributed by the Commission in an article by H. W. Rust, I read: "I was much interested to examine the whole process of making pottery. They use a soft stone which they reduce to a fine powder in the same way and with the same utensils with which they grind their corn, adding water they form a putty or clay. They take a mass of this in globular form, place it upon a small flat stone lying on

the floor; then with their fingers they form the bowl or vessel, raising the walls by pressing; smoothing the sides with a small, smooth, water-worn pebble, often wetting the same. When the vessel is formed it is partially dried in the sun, then painted with mixed colors; which they pulverize in stone mortars and apply with brushes made of the fibre of the tuca. When ready to bake, the vessel is set upon a rock in the open air and pieces of dried manure are piled all around and over it, then set on fire, and the whole mass is soon brought to the color of a live coal. These vessels are made in a great variety of forms and sizes, for all purposes of domestic use, some of them nearly as large as a barrel."

Another process, which appears to be more practical for the moulding of large articles, is described by Prof. Charles F. Harte: After shaping the bottom "she next rolls under the hand a long rope-like cylinder of clay, and attaching one end of the intended bottom of the vessel begins to coil it around the edge at the same time flattening it sideways between the thumb and finger, and causing it to adhere to the bottom." Coil after coil is laid in like manner, and the work is smoothed by means of a wet bit of gourd or shell until all trace of the way in which it was made disappears. They mixed their clay with ashes and pulverized quartz.

Fragments of pottery and jars made with coils have been found in the caves of the ancient Cliff-dwellers. Thus from a time of which no man knoweth to the present the same process has been followed.

Do not speak lightly of their work or of their lack of progress. They were but the servants of savage lords and their only motive to work was to minister to their wants. The wonder is that they showed so much skill or that ever a love of the beautiful in nature was shown in their work. I look upon it with pathetic tenderness and think, with grateful emotions, of that genius who invented the wheel, and of our enlightened civilization which holds out wealth and honor to whoever shall excel in Art.

VITRIFICATION OF CLAYS.

BY DR. R. T. BROWN.

Clay is capable of assuming a number of forms differing from each other in appearance and in general properties. There are few mineral substances with which we are familiar, that present a possibility of as many and as complex combinations as clay. The task assigned me to-day is one beset with many difficulties, and one which I fear I shall not be able to perform satisfactorily to you, nor to myself.

Clay in, in its common appearance, is a soft earth composed of very fine particles, which are insoluble in water, and yet it has so strong an attraction for that fluid as to mix with it readily and by that mixture form a soft plastic mass capable of being moulded into almost any desirable form, which may be retained after it has parted from the water by evaporation. In this state, however, it is capable of reabsorbing the lost water and returning to its plastic state. But if it be heated to a high temperature it becomes a permanent porous solid, having an earthy fracture, but incapable of returning to the plastic state by any process known to chemistry or the arts. But if the temperature be raised to a high white heat and continued at this point for some hours, the mass softens and on cooling we observe that it has lost its granular, porous structure and its earthy fracture and has become a solid mass with a vitreous or glassy fracture. It has reached a state of vitrification, in which it is not subject to further change.

What does all this mean? and how is it brought about? are the questions involved in my task to-day.

In the first place we must understand that clay is the ore of a beautiful white metal, a little harder than silver and nearly as lustrous, but only one-fourth as heavy. At ordinary temperatures it is nearly as permanent as gold, but at a high heat it combines rapidly with oxygen; each 100 parts of the metal (aluminum) taking 87.7 parts of oxygen by weight. The ruby, the sapphire and several other precious stones are but crystalline forms of this compound in combination with minute forms of other substances which give the characteristic color. But in the formation of clay this oxide of aluminum is combined with silica—the substance known by the common name of flint. The compound thus formed is technically

called an alumina silicate. It has yet an unsatisfied affinity which it satisfies by combining with an equivalent of water. This completes a neutral body and a very permanent compound at ordinary temperatures. This combined water must not be confounded with the uncombined water which clay so readily absorbs and holds by cohesive attraction with so much tenacity. This absorbed water escapes in the burning of bricks or tiles in the vapor known as water-smoke. This is always present, though the stock being burned may appear to be perfectly dry.

When the heat has passed the boiling point of water the vapor disappears, yet the brick or tile, if cooled at this point, will, on exposure to water, slowly return to the plastic condition, for the clay has undergone no chemical change. But if it has reached a bright red heat and has continued at it for some hours, it slowly parts with its combined water and the article, whether tile, brick or pottery, loses both in weight and size accordingly.

This chemical change materially affects the property of clay. It is no longer re-solvable into the plastic form. It may be pulverized and reduced to an impalpable powder, but no art can make a plastic mass of it again that can be moulded, for no chemistry can restore the lost equivalent of water. Though the substance has acquired a considerable degree of hardness, yet the particles still retain their original form, adhering only at the points of contact, and consequently the body is porous.

Now, if the clay at this stage is absolutely pure, and by that I mean, entirely free from alkali, alkaline earth or metallic oxide; it will retain its structure under any degree of heat that we are able to produce. But this is a state rarely met with in natural clays. Even the best Chinese porcelain clays show from 15 to 20 per cent. of free silica in the form of a very fine sand. But this does not prevent the clay from enduring unchanged a very high temperature in the absence of any alkaline substance. Indeed, the translucence of porcelain depends on the presence of free silica. The high temperature at which this change takes place forbids a critical inspection of the process, but it is probable the vacancy left by the expulsion of the water in the former chemical change is now filled by an equivalent of silica, and thus, acting as a flux, resolves the alumina into a semi-vitreous form. If potash, soda or lime were present the alkali

would appropriate the silica to a true glass and break down the clay structure.

In the production of what are commonly known as fire bricks, a very pure clay is selected, free from lime, soda, potash or iron-oxide, and usually a small quantity of fine sand is added to take up any alkaline matter that may be present; and if this be not large the clay will endure the highest temperature that can be produced without softening or losing its granulated structure. But common clay, such as is ordinarily used in the manufacture of brick or tile, contains more or less of lime and usually both potash and iron. In such clays the temperature of a low white heat will be sufficient to induce the combination of the free silica (which, in the form of sand, is always present) with the alkaline matter, and a true glass is the result. This diffuses itself through the porous structure of the clay, filling all the spaces between the particles of clay, giving the mass a compact texture and a vitreous or glassy fracture. If the temperature be raised to a very high degree it is possible to involve the particles of clay in this general fusion, for alumina, the basis of clay, is the oxide of a metal, and though of very feeble alkaline properties, is capable of combining with silica at a very high temperature, as has already been the case in the formation of the primitive feldspar, from which all our clays are supposed to be derived; and, though each molecule of clay is a compound of alumina and silica, yet it is capable of combining with still another atom of silica, for alumina is what chemists call a "trivalent" metal, and its compounds are capable of three distinct combinations at the same time. When the vitrification extends only to the sand mixed with the clay the mass is somewhat softened, but it seldom loses its form. If, however, the action extends to the clay, the whole mass becomes of a doughy consistency and adhesion takes place between different pieces that come in contact with one another.

In the vitrification of clays the color is generally changed as well as the structure. The oxide of iron which gives the usual red color to burnt clay, has been involved with the other alkaline earths in the combination with silica and has lost its characteristic color, and a trace of manganese, which is nearly always present, has given to the mass a dark color approaching to black.

In ordinary pottery the heat cannot

(Read before the Indiana Tile and Drainage Association, Indianapolis December, '85)

be safely carried to vitrification on account of the softening, endangering the shape of the vessels; the potter is therefore content with a heat that will produce the first chemical change, the discharge of the combined water, but this leaves the structure porous and unfit to retain water. To remedy this a wash of the oxide of lead is used on the dried vessels, as it vitrifies at a very low temperature. In this manner the surface is covered with a coat of true glass, but the intimate structure remains porous. While this secures the pottery against the transmission of fluids, it probably adds nothing to its durability. The Chaldean writing tablets found in the ruins of Babylon and Nineveh are unglazed, yet they have resisted the atmospheric influences for at least twenty-five centuries and are still perfect.

In the finer grades of pottery a glazing is made by mixing finely powdered flint with bone ashes, which consist of phosphate and carbonate of lime. To fuse this requires a higher temperature than is necessary in lead glazing, but at this high heat the glazing penetrates deeper than does the more fusible lead glazing. In the production of translucent porcelain a portion of this glazing material is mixed with the kaolin to communicate the semi-vitrification to the structure of the vessel. But the use of this, or any alkaline flux, requires care to avoid such a degree of softening as to mar the shape of the ware. In that form of pottery commonly known as stone ware the clay must be so free from lime or other alkaline substances as to endure such a heat as to induce a combination of the sand, which is present in all clays, with the clay, thus forming an alluminous glass, sufficient to vitrify the mass. At this high temperature salt is thrown into the kiln, with the result of the discharge of its chloride, while the soda, in the form of vapor, comes in contact on the surface of the ware with the free silica and forms a coating of free soda (glass) on the surface. But if the vitrification of the clay has consumed all the free silica no glazing will appear.

Every clay worker has observed the different fusibility of different clays, though he may not always have been able to account for it. The virgin soil of our timbered lands was rich in potash, and we well remember the difficulty, in early days, of burning brick hard without melting the arches. I am aware that this is now attributed to a want of skill, but there is, no doubt, a difference in the composition of the clay, from thirty or forty years wash-

ing without the annual top dressing of leaves, rich in potash, lime and iron.

In the vitrification of clays there is the closing of the pores or interspaces between the particles of clay and consequently a diminution of volume or bulk but without any appreciable loss of weight. In this it differs from the first chemical change in burning, when the molecule of combined water is lost.

EQUILIBRIUM.

BY J. W. PENFIELD, Willoughby, O.

We are here for mutual improvement, to communicate information and to receive information that we expect will be of service to us in our various circumstances. There are many things that contribute to our interest in connection with this association. Our attention will be directed first, to our relation as individuals to tile trade at large; second, a few plain words as to the work of this Association. We propose to deal largely in facts, hew to the line and let the chips fly where they will even if they fly in our own face.

That the art of manufacturing drain tile in this country has reached the zenith of perfection no one is likely to question. That tile factories are sufficiently numerous in the territory in which the members of this Convention are interested to supply all legitimate demands, is a fact no one will dispute. That the prices at which tile, on an average are selling are as cheap as can be afforded to realize any profit whatever on the investment for labor and capital is also a fact. That any effort that could be made to combine on prices so as to prevent ruinous competition would be a failure, we have abundant precedent to demonstrate in other branches of manufacturing as well as in the tile business, wherever tried. The law so universal in operation with other lines of manufacturing, commercial telegraphing and transportation companies, viz., that the big fish eat up the little fish, does not and will not prevail in the manufacture of drain tile. The small factories came first and they are with us now and to stay. If my sympathy goes out to either, it is to the large factory where competition is close. Another great law, the survival of the fittest, cannot prevail in the tile business as in most everything else, for this reason, that ordinary red tile, well burned, although rough, make just as good a drain as the most perfect glazed tile in the market. It has never been demonstrated yet, and probably

[Read before the Indiana Tile and Drainage Association, Indianapolis December, '85.

never will be, that polished, straight tiles when laid side by side with rough tile through ordinary wet land will drain the same space of land one hour sooner than the rough tile. We do not wish to be understood as favoring the manufacture of rough tile, but facts demonstrate that rough tile are now doing good work that were laid in the early days of tile draining in this country. Consequently the fine spun theories about smooth, round, straight and glazed tiles are well enough in theory or on paper, but when practical men can purchase ordinary tile for less money, they are going to do it; therefore it is useless for the tile maker to suppose that because he makes smooth, perfect tile he is going to get all the trade. The tile maker in some localities will sooner or later be compelled to face ruinous competition. I have been told there are places in Ohio where the large factories employ traveling agents, like commercial houses or other manufacturing establishments. These agents go around among the farmers and solicit orders for tile in large or small quantities and dispose of their tile right under the shadow of neighboring tile factories for less money than the farmers have been paying at their own works. Of course a man has a right to sell his tile where he can find a customer, and at any price he pleases; but look at the inevitable result of such a course. Suppose, for instance, a manufacturer whose only business is tile making, and whose entire capital is invested in the business, undertakes to compete with a farmer tile maker who is well fixed and can live whether his tile works bring him in a revenue or not, and the farmer concludes to enter the contest with his pushing competitor. You can see at a glance that it is only a question of time when the man whose entire capital is invested in the business must fail or retreat from the contest.

Our fears may be premature as regards the trade at large, but experience demonstrates that Americans overdo everything they go into and the time is coming when the tile business will be overdone in some localities. Should it not, therefore, be a subject for the careful consideration of this Association? Ought we not as brothers of a common interest to council with each other, and if possible adopt some regulations looking toward the protection of our interests?

There are many suggestions that can be made. The great law of supply and demand (equilibrium) regulates

prices better than anything else, and if tile makers will study this law carefully and govern themselves accordingly, success will crown their efforts. There are two ways this can be accomplished in a measure at least. One is by persistent and efficient effort to increase the demand. This proposition alone is of sufficient magnitude to engage the attention of this convention during its entire session and then not exhaust the subject. The other is "Union," or co-operation to regulate the output, so that it may correspond with the demand. Coal miners recognize the value of this measure. Iron workers seek to regulate their business largely in this direction, and brick makers find more help from this plan in cities than from any other.

By the assistance afforded by our agricultural reports we have as good an opportunity to find out the quantity of tile annually used in this country and the amount manufactured, as coal miners have to find out the consumption of coal; or iron and steel makers the consumption of those articles. The time may not have come yet when it is necessary for tile makers to co-operate in this important matter of regulating the supply to the demand; and the probability is they will not have sense enough to go into it when the time arrives for its necessity. Unquestionably it would be a mammoth undertaking, but not more so than many others that might be mentioned. It will certainly do us no harm to look the conditions of such co-operation in the face and formulate grounds upon which it should be based, that a correct moral sentiment may be created as a basis upon which to conduct the tile trade.

With a co-operative association, and the members pledged to certain fair and standard rules of trade, any flagrant violation of them would subject the perpetrator to censure and just criticisms, which the conservative view of the majority would approve, and individual members would be placed upon their honor to make fair deals and at the same time be a standing guard to watch the integrity of his brothers. With an association of this kind, when the market became over-stocked with tile, a graduated scale should be arranged and each member by mutual consent agree to a reduction of the annual amount of their manufacture, so that it might be brought within the legitimate demands of the trade. This would give all a fair chance and not allow a few factories to monopolize all

the business.

A few words now as to the work of this Association: We can make it just what it should be if we will, or we can let it drift till it becomes the head of a lot of side exhibits of brick and tile machines, ditchers, tile tables, fence posts, etc., etc. No one questions but that an exhibit of such machinery at an appropriate place and time would be of interest and desirable both on the part of manufacturers and users; but for individual members of this Association to put machinery on exhibition open for inspection during the regular days of our meeting and while we are in session, and without the approval and direction of this Association, is setting an example which, if followed up, will produce serious if not disastrous results with our future meetings.

There might be arranged by the mutual consent of all parties interested an annual exhibition of such machinery, open to all, at some appropriate place, under the direction of a committee appointed by us to arrange and superintend the display; and by extending the time from two days to four or five we might be able to do justice to both departments and further the legitimate work of our association.

A word to our advertising mediums: The majority of trade journals and agricultural papers mix up the advertising matter with the reading, very much to the annoyance of parties not interested in the advertising. We hold that if an advertisement can't be made sufficiently attractive to call the attention to it when occupying the department devoted especially to it, it had better be left out. The fact of advertisements being mixed in with reading matter is too suggestive of the dodge resorted to by patent medicine men, who head their "ad." by some thrilling item of news or grand effusion on some interesting topic of the day, to ensnare the reader to look at that which he would detest to look at undisguised. Such advertising is a shameful insult to human nature.

THE BURNING OF CLAYS.

BY W. A. EUDALY.

It shall be my purpose to-day simply to offer a brief outline of some of the more important things a successful clay burner should know, have and do.

In doing so I trust I shall be able to suggest some thoughts for the further consideration of this convention.

This is a subject of very great importance to clay workers. Burning is the

one thing that cannot be dispensed with in the manufacture of earthen wares, at least in our day and generation. What the ancients did is now a matter of history. We cannot, however, help wondering at the ignorance of some of our customers in the age of sun-dried bricks.

The time has come when our wares must be burned properly and with economy, if we expect to make a real success out of the business, and when I say success I refer to the profits we ought reasonably expect to realize from a well conducted business of any kind. You may make and burn some splendid wares and yet fail in a business sense because you lacked economy.

By economy is not simply meant the amount of fuel you use; but the number of well burned pieces taken from the kiln in proportion to the number put in. We burn clays for two reasons: First—To make them durable and strong, suitable to the many important uses to which they are applied; and secondly—That they may become ornaments to please the fancies of the curious, or the more cultivated tastes of a civilized country. In order that the clay burner may accomplish all that is desired, he must know a great deal more than a majority of us, or even a large proportion of clay burners themselves imagine is necessary to be known.

He must know what burning is both as a science and by actual practice. He must know something about the composition of clays and their preparation; how they have been moulded, the manner of drying and setting in kiln. He must know his kiln and its capabilities, as well as that of his fuel. The condition of the atmosphere while drying, setting and burning should be his constant study. Last, but not least, is a proper knowledge of the amount of heat necessary to produce the desired effect. Above all, he must know when and how to apply this heat—when to start, how fast to go, when and how to stop.

From this partial outline we are enabled to see that in order to be a thoroughly well informed clay burner, one must have in store no small amount of clay knowledge as well as practical experience.

You ask the general question: "What is burning?" and you will receive the answer from a very large majority of clay workers that "it is burning," while occasionally you will find one who has taken the pains to give the subject something more than a casual notice. Perhaps he has been

[Read before the Indiana Tile and Drainage Association, Indianapolis, December '85.]

reading some book or Journal devoted to the subject. At any rate he will inform you that burning depends to a greater or less extent upon the composition of the clay from which your wares are made. That, properly speaking, burning may be baking or vitrifying, or partially both, as your clays are refractory or fusible, or vary from one to the other of these qualities. Here we have the problem solved at once. Too many burners simply burn without knowing what they are burning or how they are burning.

I once knew a man of more than ordinary intelligence about some things, but he knew very little about clays and nothing of burning. He had an idea that pugged brick could be taken direct from the machine to the kiln, fired with coal at once, and burned. He had also been in some tile makers convention and heard it stated that tile could be burned in from thirty-six to forty-eight hours, so he concluded that brick could be burned in the same length of time. He fired his kiln and I am informed that the brick were burned to one solid mass from top to bottom and had to be taken from the kiln with crowbars and sledges. The trouble was, he had a clay that vitrified easily at a low temperature and by hard firing in the beginning the outside or surface of the bricks melted, and, not being made with a sand coating, run together before the center was burned. He should have dried his bricks thoroughly before setting them in the kiln and then increased the heat very gradually until they were almost at the point of melting and then held at the same temperature for several hours, so as to allow the center of the brick to become thoroughly burned.

The refractory or baking clays contain very little lime or alkaline matter but are chiefly composed of alumina, magnesia, or some of the various compound oxides, and when exposed to a high degree of heat become hard and compacted in proportion to the fineness to which the particles have been reduced before moulding. The burning of these clays produce rather a change of molecular aggregation than that of chemical combination.

Fusible clays are composed largely of lime, magnesia, or metallic oxides, or some similar substances, which act as a flux and melt at a comparatively low temperature. The fusible clays are much more difficult to burn. It requires great care in firing to prevent them from running together in the kiln. There is great danger also in burning too fast, as the wares are liable to become vitrified on

the outside before they are thoroughly burned inside, consequently the outside and inside present different colors when cut or broken. With brick this is a very serious objection, as the cut surface is often exposed in the face of the wall. Very slow firing will in the majority of cases overcome this difficulty. Clays that contain much carbonaceous matter when burned too fast, or not well burned often present a different color also on the interior from the exterior.

Again clays containing chloride of sodium (common salt) are very difficult to burn, as the salt when volatilized combines with the metal oxides, both being carried off in the form of vapor. The result is, wares made of clays containing these compounds tend to fuse, warp, twist and vitrify, or agglutinate on the surface long before they are sufficiently burned in the center.

besides the facts necessary to be known of the composition of clays, the burner must know something of how his wares have been made, dried and set. It is a well known fact that wares made from dry clay under a great pressure are much more difficult to burn than those made from the same clay when pugged, with but little or no pressure.

[CONCLUDED IN OUR NEXT.]

Written for the Clay Worker:

TRADED A BRICK-MAKER FOR A MERCHANT.

A Story of Real Life.

CONTINUED FROM LAST ISSUE.

We were frequently in company and her repeated assurance of undiminished attachment led me to believe her faithful to our engagement, notwithstanding her frequent appearance in company with Mark Brown.

Late one Sabbath afternoon some six months after Mark Brown's return I took my leave of Carrie some earlier than common for the reason that I had a kiln of brick that needed my personal attention in finishing the work of firing, and I so stated the fact to her. As I passed out through the wicket gate into the street she called to me laughingly and said "I have concluded to trade my brickmaker for a merchant!"

"You don't mean it", I replied.

"Yes I do and you needn't come any more, no explanations", and with a wave of the hand she ran into the house and was out of sight. I stood for a minute utterly dazed; I saw that she meant it,—first, I thought I would turn back and demand an explanation, but on second thought I concluded it was nouse. Homeward I made my way; my feelings were intense; I could see how it was. My business required attention, my clothes were often soiled, my hands were rough and large from daily labor, my cheeks were brown; all this was too much on the wrong side of the balance, and was outweighed by the merchant, notwithstanding the fact that he had been known to be more than once beastly intoxicated. In a few

weeks, Carrie and Mark Brown were married. Very few persons among my acquaintances made any reference of the matter to me.

My business prospered and I soon dismissed the whole affair from my mind. Mary F—— continued to visit our family, not more frequently than before, or less, that I know of; her manner was the same. She had many admirers but treated all respectfully—kindly but nothing more. I very naturally appreciated her society, enjoyed it more and more and in my twenty second year, she and I were engaged, and soon after married. Before my marriage my two sisters were comfortably settled in life. I did not care some way to stay in the town of C—— and sold out and came to this State (Ill.) bringing my mother with me. She soon passed on to the Spirit land. * * * * *

Twenty years passed, after my settlement in the State, I had accumulated quite a comfortable living, when on a business matter it became necessary to visit my childhood home at the County town of C——. I met and recognized many of my old acquaintances, and unexpectedly met Mark Brown. He was a pitiable sight, a loathsome, drunken vagabond. I met him kindly and enquired after his family—learned where they lived. I determined to visit his home and did, and found his wife at the wash-tub—for she supported the family by washing and by the help of her two little boys, who worked when they could find employment. She, that I once called "my Carrie" was not (by far) the beauty I had remembered her to be. She was poorly clad, her arms and hands betokened hard daily toil, her surroundings were bare and cheerless. I talked cheerfully and referred to old times and changes of the town, now a city. She was embarrassed. I pitied her in my heart, and as I bade her "good bye" and turned to go away, I could but feel grateful that the trade of a "brickmaker for a merchant" had not worked any special damage after all to myself.

On D—— street in the city of Chicago there is a substantial brick residence, well furnished inside (if I do say it myself) and the queen of that home is the same blue eyed Mary F—— (of other years) and two sons and two daughters—and there is music and mirth.

The matronly woman is looking over my shoulders and saying, "there now"—"there now", thats enough", "your vanity is gratified". But in closing my story of real life I must say, I am glad that I was a "Clay Worker".

THE "BRICKMAKER."

CORRESPONDENCE.

Favors Semi-Dry Process.

Editor Clay Worker:

The communication signed "Progress" in your November issue has come to my notice, and I beg leave to say: As there are some very striking facts in the article, there are also some remarks that would with many readers require exchange of opinion.

The correspondent making use of the phrase of having known all about brick making ten years ago, and just beginning to realize of only having now reached the rudimentary principles of brick making, further acknowledging the opinionated and egotistical character that prevails among Chicago brick makers. The former assertions, even if they should not be justly fitting, "Progress" and his associates, nevertheless, are so strikingly honest; for many other brick-makers who in their own ideas have learned so much that in reality they are learning to know less instead of stimulating improvements, that the expression deserves commendation.

But I am not yet through with your correspondent, who admits of having to learn yet; and that there is something to be developed yet in brick making. I have no intention of forming sentences of flattery nor offences, but want to get at the absolute practical substance of his argument, which in some forms changes into contradictions. If "Progress" has only aimed at the rudiments of common brick making, not having himself any practical experience with semi-dry process, I want to ask how he knows so positively that the former method cannot be successfully applied with the "tough blue clay of Chicago?" Are we to take as his proof, because some yards have failed? If that is the only reason then we have cause to condemn every other system of brick making, as there have as many brick yards (of all descriptions) failed all over the country as run successfully. The second proof offered is that the Anderson Brick Company have tried for two years to work the Chicago clays. But did they not undertake to make front brick out of it in its natural state? And as the Chicago clay in its homogenous conditions does not contain the qualities of color and purity necessary for facing brick, how could they succeed? The observation, if not misunderstood, "the visionary fools and willing dupes" of semi-dry process are not to be found among Chicago brick makers; really where the glory comes in on that is difficult to locate,

It would be, perhaps, more creditable to their names and respect had they shown any disposition to go ahead with something new, and give their knowledge and experience to a process worthy of improving and developing, that brick may be made for less money to the consumer and more profit to the manufacturer, and, without doubt, end the continuous flurries in the trade that are brought on by ever expected strikes of the now so called brick makers. When if a method is adopted that requires no skilled labor, then every laborer is a brick maker, as far as labor extends on the yard, and in case of disturbance places can easily be refilled. Under the present conditions Chicago brick makers are complaining, only realizing expenses, when selling brick at from \$7 to \$8 per thousand. They are howling that they ought to make a better brick for less money. If someone comes with a method that has proven cheaper, better and successful elsewhere, they are not willing to devote any time and money to bring it in operation on their own yards, but stand off and sneeringly discourage everybody connected with such an enterprise. If the condemnation is done in a sense of fore-knowing then it may be lack of judgment of what yet will develop out of the new ideas. If the opposition is made in a view of fear that some party may start and be successful and supersede the "mud style" and leave their machinery on a scrap pile, then it is lack of energy and honesty to keep up with world. Yet in my own belief I should not recognize either of the two just given theories, as I think that all brick makers about Chicago are actually sincere in wishing every yard success with any changes that they may put in. But the trouble, I dare say, is here—As a class they are busy and hard workers, and do not take sufficient time to go to other localities to post themselves well how the advance of others was accomplished. Some day these self-possessed men will see one more mistake, just as "Progress" informs us in the first part of his letter—that the visionary fools will have gone to the top, being able to sell brick at \$5 per thousand at large profit.

"Progress" can feel assured whatever money has been lost at dry process in the vicinity of Chicago was not on account of inconsistency of the process, and not particularly the clays, but it was the know-nothing-ness of the contemplators, the incompetence of the operators in practical charge; and the failure of their machinery probably more than any cause. There was no more swindle

about those yards than any other Chicago yard. It was simply the feasibility of success that looked so plain in the method but which they could not accomplish that forced them to give up.

In conclusion I will only state that any clay of reasonable plastic body can be worked into semi-dry process if a suitable press is adopted, as far as machine capacity concerns; but it must not be expected that the product, because being made on a semi-dry press will be exceedingly superior in color. Whatever the raw material will ordinarily in color produce cannot variably be changed by manufacture unless chemicals and minerals are applied; and while speaking of minerals I will remark that there is no particular obstacle in the way of making red brick of Chicago clays; also the limestones can be ridded. But all these changes render the clay too expensive for common uses, and doubtless not make them to best advantages for front brick. Then within the last twelve months so many superior clays have been discovered within profitable reach of Chicago to manufacture and ship the better brick from; where labor and coal can be had at lower rates than the rings and unions of Chicago demand.

To separate the limestone sufficiently for good building bricks profitably can only be done satisfactorily with the clay in a semi-dry condition, therefore comes in best with that process, and will not incur any notable extra expense. Hope that "Progress" will take a less prejudice view of dry process and look into the matter to convince himself by truthful observations why so much money has been needlessly lost in those new style steam yards, which are looked upon by many less instructed on the subject as experiments and schemes.

Chicago, Dec. 5, '85.

F. P. M.

Economizing the Waste Heat.

Editor Clay Worker:

We think that we have now in use the best dryer, as also the best and most economical kilns. We dry our bricks in the second story of building, directly above our kilns, the kilns being arched. The waste heat from the kilns drying the bricks while burning and for two or three weeks after, providing we wish to hold the heat in the kiln so long. We take our bricks direct from the machine on a belt to the second story and hack on planks for that purpose, each plank holding 400 bricks. Then with a truck that is made to run over the hack and lift it, we remove it on a R. R. track to any part of our drying room, when dry,

take them with the same truck to the elevator and to the ground floor on tracks into the kilns; then they are taken off the hacks and set, making but two handlings of them. By our process we claim that we use less coal and as little handling as any Kilns and Dryers in use.

We use Chambers, Bros. & Co. machine, convey clay to the machine by cars direct from the bank; we have both very strong and weak clays, it is tempered by the machine. We make between 30 and 40 thousand per day, Stretchers, Dark and Light, Hard, Paving and Salmon bricks. Last year we ran the machine up to the 23d of December; we expect to run as long or longer this year. We get our draft from a stack 110 feet high, one stack doing the work for 4 kilns; two of the kilns hold 350,000 each and one 300,000. We expect to build another kiln this winter. Drying room is directly over the kilns. Our buildings are 300 ft. by 60 and 110 ft. by 55, 27 feet high, brick wall, tin roof.

HATCH & BRO.

Camden Co., N. J.

Information Wanted.

Editor Clay Worker:

I am a brick and tile maker and being a subscriber to the Clay Worker, which I consider a very valuable publication, come to you for information in regard to a down draft-kiln for tile. My present kiln is a large one holding 70 thousand two-inch tile. It is built of stone and lined with brick. I think it can be arched over and modeled into a down-draft and intend to make the change; any information you can give me about it will be appreciated.

My trade is quite good. I make during the season about 600,000 tile and three to five hundred thousand brick. The demand for tile is strong. I retail about half and ship the balance. Demand for brick is equally good, nearly all of them going at wholesale. I use a Kells & Sons machine with clay crusher run by 25 horse-power engine. My tile kiln is about 20 by 30 feet inside and high enough to set eleven courses of tile 16 inches long. I use forty cords of wood to burn each kiln, which is rather expensive as the wood costs me \$3.00 per cord. The quality of the tile is not surpassed in this market and in fact I have never seen tile anywhere that I thought as good as ours.

Cayuga Co., N. Y. GEO. W. CLARK.

[We will be pleased to have any of our readers give Mr. Clark the benefit of their experience in rebuilding kilns through our columns or if they prefer by private letter addressed care this office.—ED.]

DIFFERENT KINDS OF CLAYS.

We pass along the streets of our populous cities and meet thousands of people and no two faces in the vast multitude can be said to be exactly alike. The same is true of many other things in nature. And especially true of clays. To say nothing of how clays were made, we know they differ, some more, some less,—they are not alike plastic or refractory, or alike easily worked.

Clay suitable for manufacturing brick for building purposes is obtained from alluvial deposits, but there is a great difference in what are commonly known as brick clays. The clays in some localities are suited to the manufacture of dry-pressed brick, in another locality soft mud brick prove to be the best brick. Another clay is suited to the manufacture of ornamental brick. Indeed the manufacture of the latter is becoming common. Philadelphia at one time had the lead in this kind of clay products, but recently we have been shown some fine samples made in Chicago, St. Louis and other cities. As the art of clay working advances, the manufacture of ornamental brick will become quite common. The disintegration and mixture of clays to produce given results will be generally practiced.

There are clays suited to make brick directly from the bank by pressing it through the dies. Some of the tile machines now in use are especially adapted to the manufacture of brick and are being used successfully in all parts of the country.

Clays are not only improved frequently by mixing two or more clays together, but often much improved by adding considerable sand. The latter is used to great advantage where the clay is liable to crack in the kiln. Clays having over three per cent. of lime in them are not suitable for brick manufacture. Clays containing a sufficient quantity of the oxide of iron make building brick having high colors. The clays about Milwaukee are comparatively free from oxide of iron and consequently burn white. Many of our common clays make excellent drain tile, burning to a hard vitrified body. Potters clay is well suited to the manufacture of drain tile, but requires a higher heat than common clay and will take a salt glaze. Such clay is especially suited to the manufacture of the Sheldon fence post, and there is, in our judgment, a promising future in the manufacture of this post. Clays suited to the manufacture of fire brick are especially valuable for this purpose because they resist the effects of high heat and will not unite,

forming a hard body, or, to use a more common term, melt and run together.

It is often desirable to mix fire clay and common clay in making different kinds of clay products. A proportion of fire clay sufficient to preserve the perfect form of the ware and the other vitrifying and forming a hard body. Clays for the manufacture of the finer wares have not been found in large quantities, sufficiently convenient for large manufactures.

The general clay working interest of the country have much yet to learn in the management of our clays and every clay-worker needs to keep his eyes open and his brain in active exercise in clay working.

In this brief consideration of the subject we have not attempted to go over the entire list of uses of clays in the manufacture of clay goods, but we have only intended to hint at the fact of the many varieties of clays and to direct the attention of our readers to the importance of making careful experiments in combining different varieties in various proportions and note the result under different treatments. It is a wide field for the making of careful experiments, and much good may come from careful tests made by careful men.—*Drainage Journal*.

HINTS TO ADVERTISERS.

The St. Louis Building Trades Journal in some "hints on advertising" says; "Another thing which publishers have to contend with is that the result of advertising are not always visible to patrons, many of whom cannot understand why custom cannot be directly traced to the source where they expended their money to obtain it. Business is like a river with many tributaries, and in which it is impossible to trace every individual drop of water to the spring from whence it came. But if a journal is selected for advertising purposes that reaches time and again the persons most likely to be interested in the solicitation, that paper is a sure fountain-head of profitable trade in the stream of patronage far below. Temporary advertising in a small way will not produce an immediate increase of business any more than a light shower will affect the depth of water in a well, but by persistency in the use of printer's ink in the right direction the results sought will be gained in the end with interest."

Subscribe for the Clay Worker.

THE CLAY WORKER

INDIANAPOLIS, IND., DECEMBER, 1885.

Entered at the Post-Office, at Indianapolis, Indiana, as second-class matter.

Terms of Subscription.

One copy, one year,	\$1 00
Six copies, " " " "	5 00
Ten copies, " " " "	8 00

ADVERTISING RATES FURNISHED ON APPLICATION.

Correspondence on all subjects of interest to Clay Workers is invited. Communications from practical men will always be welcome. Address all communications to

T. A. RANDALL & CO.,

25 Thorpe Block Indianapolis, Ind.

CLOSE OF VOLUME IV.

With this number of the Clay Worker we close the fourth volume. Our readers therefore will pardon our pride if we briefly review the work done.

When we commenced the publication of the Clay Worker, it was thought by some of our friends that the field was not sufficiently promising and that we ought to embrace other industries. Some said, "add coal or iron"—"have a broad field", but true to our judgment we said "No"—the clay working interests are "broad enough". In the first editorial in the initial number of the Clay Worker under the head of "Good Intentions" we said:

"In the publication of the Clay Worker 'we intend' to devote its columns to furthering the interests of clay workers. We intend to give our readers carefully prepared articles upon the manufacture of brick (of all kinds), roofing and encaustic tile, terra cotta, sewer pipe, pottery, etc. 'We intend' to gather for our readers from every available source the every day experience of those engaged in the lines of work above indicated. 'We intend' from month to month to give the news items of clay working.

"We are proud of our initial number, and 'we intend' to grow larger and better as we grow in age.

"We intend' to make the Clay Worker so valuable as a source of information that no clay worker can well afford to do without its monthly visits, fresh and crisp (as it will be), from the field of practical work."

Need we ask if we have been true to our "good intentions"—thousands of our readers know right well that we have continued steadily in the line first marked out. In every number of the Clay Worker there have been articles of great value to the business, prepared es-

pecially for its columns. Our correspondence has come from practical men, men actually engaged in clay working, who write from experience—in addition we have secured the services of practical men in science to write articles for publication upon special subjects, such as relate to clays and the science of clay working.

Our reports of important news relating to the clay working interests have been full—it is true that we have not reported when Jones or Smith opened or closed the doors of their works, for the reason that we have thought that our readers did not care to know such trivial things, but rather have thought it best to devote our space to more desirable information.

OUR ADVERTISING PATRONAGE has been most gratifying indeed—the very best class of manufacturers of clay working machinery, have favored us with their patronage and it is the more gratifying to know that once with us, they continue with us, and are not only ready to pay us liberal rates, but again and again commend us for the value of our columns as an advertising medium. We feel particularly happy in being able to render the service of providing so valuable a medium, as to place those who favor us with their patronage before the entire clay working trade of this county and others, and in this public way we wish to thank those that have favored us with their patronage, and express the confident belief that in the future we shall have their patronage and best wishes as we continue to enlarge their and our field of usefulness.

OF THE FUTURE.

"That we have grown larger and better" (as predicted) we have abundant evidence—that we have the facilities today of widening our field almost without limit is evidenced in the fact that our circulation is rapidly increasing, and men of ability are offering us the helping hand in all parts of the county. We have already arranged for valuable contributions for the coming year. It will become more and more valuable as a source of information, so much so, that no clay worker of any enterprise will do without its monthly visits "fresh and crisp from the field of practical work."

BRICK VS. STONE.

A very lively competition has been going on before the Assistant Secretary of the Treasury for the contract of furnishing stone, or granite, for the government building to be constructed at Pittsburgh, Pa. Indiana Congressmen

Cobb, Watson, Howard, Kleiner and Ward appearing for the Bedford (Ind.) stone, for which it is claimed that it is the most durable building stone known in the United States. It would cost \$100,000 less than granite. The engineers set up the claim that the oolitic stone will not withstand the smoky sulphuric damp atmosphere it would have to encounter there. One of the County engineers claimed that no stone would stand the atmosphere of that city. He said: "If we cannot have granite give us brick."

In a conversation with Dr. R. T. Brown, who was formerly Agricultural Chemist in the Agricultural Department at Washington, the Doctor said: "The engineer is right, for durability there is nothing better than brick. While we have a conscious pride in Indiana stone, and recommend its use in preference to any building stone in our knowledge, yet it is true that for building permanent structures brick, well burned, are best.

BORING WITH A BIG AUGER.

As illustrating the large way in which they do things out West, we note that a man who owns a large body of land in Ford county, Ills., is proposing to make tile at a minimum cost next year. He proposes to economize in the handling. He will have his mill at the top of a little grade, down which small cars will run of themselves and carry the green tile toward the kiln and sheds combined. Enough cars will be provided so that the tile can be "hacked up" right from the cars, and be allowed to dry in the kiln, which will be large enough to contain the summer's work. Only one kiln will be burned per year, and that late in the fall. When burned, one wall of the kiln will be torn down to get at the tile, and the wall moved around to the other side to repeat the operation for another year. He even hopes to float them, at least part way, to their destination in a flat-boat on the big ditch which is the outlet for the tile drains.—*Cor. Engineering News.*

"The above extract, to every practical tile maker, will be amusing. We are reminded of the story of the man who invited in his neighbors to aid him in the painting of his hotel sign, and when it was completed to the satisfaction of the company, the wife of the proprietor suggested that they add a horn, and the proprietor crawling out of the little end of it—and a like suggestion will have a practical application in all schemes like the above."—*Ed.*]

THE INDIANA TILE AND DRAINAGE ASSOCIATION.

Held their annual meeting in this city December 8th and 9th. The attendance though numbering about a hundred delegates was not as large as it would have been if the weather had been favorable. They were welcomed in a very timely address by Governor Gray, and presided over by the President Robert Thomas. The papers and discussions were practical and interesting from the beginning to the end. The following papers are deserving of special mention, and will appear in our columns as we may have space for them.

"Equilibrium" by J. W. Penfield, of Willoughby, O. He urged upon tile makers that they should co-operate like other manufacturers in order to avoid the ruinous practice of killing trade by cutting rates. They should utilize the advantages coming from this association and should endeavor to mold public opinion to a recognition of the necessity of co-operation among tile makers. That tile makers should disseminate among the farmers information concerning the usefulness of tile drainage, and thus create a demand for tile. They should utilize agricultural reports to find how much tile was used and how much was being manufactured, so as not to follow the American plan of over doing the business, but to regulate the supply to the demand, and, if necessary, curtail the output in the same manner of coal mine operators.

"The Burning of Clays" by W. A. Eudaly, of Cincinnati. His paper related to the various kinds of clay used in burning and the chemicals used in the operation. A good kiln would be one in which the wares were all burned hard, and were uniform in color, other things being all right. The various things to be considered in watersmoking a kiln were the amount of water in it, the size of the kiln, the kind of fuel used and the condition of the atmosphere. The weight of water removed by one cord of hickory wood was 1,116 pounds.

Drainage as a Sanitary Measure, by Dr. I. C. Hunter of Napoleon, Ohio. This is an interesting paper dealing with the practical side of the question as it relates to villages, towns and cities. We hope to publish it in the next issue of the Clay Worker.

"About Clays" by D. W. Stookey, of Buffalo, Ill., was read. He discussed at length the various clays and their qualities, the various ingredients in tile making and precautions to be taken. In conclusion he said, "Burned clay being the most durable of all manufactured ar-

ticles attests the advancement of mankind at various times and in different lands. Prehistoric man in both continents has left buried with his bones and in the ruins of their structures, culinary articles, sacrificial and burial urns which not only testify to his skill as a worker in clay, but give an insight into home life, his love for the departed and the activity of his religious faculties. The comparatively recent cliff dwellers of New Mexico and Arizona leave many testimonies of their skill, and the natives of Mexico, a little further south and of still more recent date, built their adobe houses of sun-dried brick.

The reading of the paper was followed by a very general discussion. We shall publish the paper in full in the next issue.

"The vitrification of Clays" by Dr. R. T. Brown of this city. He spoke at length of the various clays used for making bricks, pottery and tile, of their varying fusibility. He discussed the merits of different kinds of glazing, and gave the chemical constituents of each. The paper was very interesting one. The reading was followed by a discussion of the subject, the members giving briefly their observations in the burning of tile, brick and other products.

A very general discussion of many practical questions, relating to the selection, and management of clays and how to increase the sale of tile, were had during the sessions of the convention. It was the general verdict of those in attendance, that it was the best the association ever held. The election of officers for the ensuing year resulted as follows:

President—Thomas Chandler, Indianapolis, Vice president—G. S. Pollock, Sullivan, Treasurer—M. J. Lee, Crawfordsville, Secretary—T. A. Randall, Indianapolis.

After the discussion of various minor matters and the adoption of resolutions of thanks to the State Board of Agriculture for the use of their rooms and to the visitors from other States for their work in the meeting, the association adjourned to meet in this city on the second Tuesday in December 1886.

Mr. Samuel Bergen, of Franklin, Ind., one of the first tile makers in this state, exhibited a piece of tile at the late convention which was made and laid in 1855. It was dug up a short time since and although a soft burned tile, its 30 years of burial has had no perceptible effect upon it, it being as sound and perfect now as when first put in the ground.

THE NEXT TILE AND BRICK CONVENTION.

The Illinois Tile, Brick and Drainage Association will hold its eighth annual session at the State House, Springfield, Tuesday and Wednesday, Jan. 19th and 20th. The following papers are provided for upon the programme:

"Practical Management of clay from bank to kiln." by George Gillen, Canttrall, Ill.

"Setting and burning." by M. C. Dawson, Lawrence, Ind."

"Brick Making and Burning," by Robert Thomas, Indianapolis, Ind.

"Sanitary Effects of Drainage," by G. E. Morrow, Champaign, Ill.

"Waste of fertility from surface washing, and the remedy," J. J. W. Billingsley, Indianapolis, Ind.

"Drainage Districts and their outlets," by C. G. Elliott, C. E., Tonica, Ill.

"Benefits derived from tile drainage," by W. Hammett, Canargo, Ill.

"Future Drainage Legislation," by Hon. L. D. Whiting, Tiskilwa, Ill.

Those desiring information relative to railroad rates, etc., should address Col. C. F. Mills, Springfield, Ill.

Messrs C. & A. Potts & Co., will exhibit their Disintegrator in operation at Springfield, Ill., during the Tile Makers Convention in that city.

During the coming year Minneapolis will expend \$100,000. for new sewers and \$250,000. for new water mains.

When writing to advertisers please state that the "ad" was seen in the CLAY WORKER, and you will confer a favor on both advertiser and Clay Worker.

Navasota, Tex., contemplates the construction of a system of drainage, and B. M. Temple, C. E., has been engaged to prepare plans to that end.

The City of Mexico is about to build a sewer for draining the valley. It will be five and a half miles long and cost about \$4,000,000.

Messrs Blackmer & Post, sewer pipe manufacturers, have in contemplation the building of new pipe works at Belleville. If they find it possible to secure satisfactory freight rates from the railroads between Belleville and East St. Louis the works will be built and their present capacity doubled.

It is found that the clays in the vicinity of Millbank, Dak. makes a fine red pressed brick, and some of the citizens, after seeing a sample brick made from it, are quite enthusiastic over the prospects of producing something that that section of the country is greatly in need of. It is proposed to organize a company for manufacturing brick from this clay.

Written for the Clay Worker.

BRICK MANUFACTURE.

BY "S. N. C."

For the benefit of inexperienced men contemplating the manufacture of brick and with a view of exchanging ideas with practical men through the columns of the Clay Worker, I submit the following hints on some of the important, and more perplexing questions concerning the manufacture of brick from common clay.

For the past sixteen years, I have followed this line of industry in Illinois, and to me it is a very interesting study.

One of the most important necessities to the success of a brick manufactory, large or small, is a good foreman. He should be a practical workman and understand the business in all its details, also be possessed with the business "knack" of seeing to it, that each of his workman perform their part with the "slight" common with good "yard men." His habits should be such as to command the respect and confidence of his employer.

As a rule, brick makers are constantly in danger of loss—there is no business that requires more constant attention. For yards making three or four hundred thousand or less, I think hand moulding best. There is much advantage in the pallet system of drying for both hand or machine made brick. In the use of pallets, the brick can be handled so as to preserve their perfect form, edges and corners, otherwise if they are dumped on the yard, they are likely to be rough and wedge shaped. With pallets the brick can be protected against a sudden dash of rain without having to hack them. Where there are no permanent walls the place intended for the kiln should be made level, square if—not, tump it. This is a point too often overlooked. To keep the benches from separating and having open places, there should be binds six or seven courses from the top.

The burning is the most important part, and to be a good burner is something to be proud of. No two kilns or clays burn exactly alike—so that in burning, experience, judgment and close attention are required. There is no rule which will apply to all, but each kiln needs to be managed to suit the clay and its condition. First, is the white water smoke; next, the red heat; last, the white. Green brick set in a kiln are the most difficult to burn, and indeed green brick should not be set in a kiln if it can be avoided; but if set, then the burner must water smoke slowly with a smoldering fire, taking six or seven days to do it. The moisture should be expelled in a thin blue and whitish smoke, keeping the kiln at a low temperature until the water is off of the heads, at least four feet from the case wall; then increase the slowly until only a little moisture can be seen in spots in the middle—then slide dry wood to the center as fast as it will burn up, not to "rag" the "jets".

The mouths should then be kept closed and heat up the heads and get the heat through the kiln. The corners and sides should be kept a little in advance,

hold a pale red heat with closed doors until the heat is through the middle, which takes time. When the heat becomes uniform, which is indicated by the black smoke coming out between each course, then slide to center and continue to increase the heat gradually until the middles show heat—until it is hardly possible to walk over the kiln; then if the clay is the kind that settles, it will show it. Then close one of the heads air tight and fire against it from the opposite side, with mouths partly open, keeping the open mouth full of blazing wood—also sliding to middle, but making sure of the head first; the middle will come right. Ground once lost on the head is never regained.

Continue the fires until the brick settles (the clay shrinks in burning) evenly over the top; if the clay does not settle then, be governed by the temperature of the heat on the surface. The heat must show well out before the brick are burned well up close to the top; settling without a show of heat on top indicates something wrong. Do not close a kiln until the blue and purple flames actually dance over the top and every crack is grinning with heat. The sides of the kiln should be heavy cased, to bring the heat out well to the sides.

Where the demand for brick will justify, use some of the systems for burning advertised in the Clay Worker—they will soon pay for themselves; the same is true of systems of drying brick. By having first class modern improvements, better brick can be made at less cost. Brick made from a good soft mud machine, dried on pallets, and well burned, are equal to the best hand made brick.

A BIG OFFER.

Who will offer the preventive and get the reward. The following item we clip from the Chicago Tribune:

"I will give any man \$100,000 who will produce anything that will prevent a pressed brick wall from turning white," said a prominent architect. The remark was called forth by the appearance of one of the finest office buildings in the city, recently completed at a cost of \$500,000. A glance at the huge pile of pressed brick discovered numerous streaks and blotches of white covering the greater portion of the surface of the four upper stories of the grand structure. "That white appearance," said he, "which is unpleasant to the eye, is not injurious to the wall, but it is decidedly objectionable. It is sulphate of magnesia—although generally called saltpeter and is brought out of the bricks by the moisture in the atmosphere."

"In a very dry season it does not show itself so much, but in a wet season like the one we have recently had it forms an incrustation that makes a brick wall appear at a great disadvantage. Many experiments have been tried to prevent its appearance but without effect. Many walls of pressed brick are oiled as soon as completed. This prevents the appearance of the magnesia for a while, but it will even come through heavy coats of paint. This white appearance is not so objectionable in a business block, but when it makes its appearance on the

front of a handsome residence as it has, for instance, on a handsome double house on Michigan Avenue, the basement and first story of which are of Carbondale stone, and a number of others which I have recently observed, it destroys for a time the harmony which the architect has attempted to create in the combination of pressed brick with stone and other material.

"The same substance has appeared on some qualities of stone not now used in Chicago architecture, but it is not so readily observed on account of the color of the stone and because the quantity is not so great as it is on the brick. If some one could discover a way to make pressed brick that would resist the action of the atmosphere in the bringing out of this white incrustation, or a preventive, he would not only be a benefactor, but would have an assured fortune. The fact that this magnesia is brought out by the wet weather on pressed brick has, no doubt, stimulated the use of stone and other building material in the architecture of Chicago."

NEW PUBLICATIONS.

A copy of the Report of the Mineral Resources of the United States for 1883 and 1884, has been received, embracing coal, petroleum, natural gas, iron, gold, silver, copper, lead, zinc, quicksilver, nickel, cobalt, manganese, chromium, platinum, iridium, tin, antimony, bismuth, aluminum, building stone, clays, precious stones, phosphate rock, gypsum, fertilizers, salt, sulphur, pyrites, mica; mineral paints, chalk, etc. The report embraces a brief statement of the statistics of each product—how mined or manufactured. Exports and imports (if any.) The chapter devoted to products made from clay numbers some thirty different kinds that enter into the commerce of the country, making a chapter of much interest to clay workers. The labor of gathering the material for this very valuable report of 1,000 pages has been performed by Albert Williams Jr., Chief of the Division of Mining Statistics and Technology, and embraces the calendar years 1883 and 1884. Price 60 cts. The first volume for 1882 may be had for 50 cts. Remittance should be made by postal note (not stamps.) In ordering say "Mineral Resources for 1882." or "Mineral Resources for 1883 and 1884." Address—Director U. S. Geological Survey, Washington, D. C.

DORCAS is the title of a charming little monthly magazine of woman's handiwork, edited by Laura B. Starr. It is devoted chiefly to needle work of various kinds, and will prove a valuable and interesting publication to all the fair sex who are especially interested in such work. Price \$1.00 a year. Sample copy 10 cts. Address—Laura Starr, Ed. "Dorcas," New York.

Raymond & Pricer, Dayton, Ohio, have issued a circular and price list of brick maker's supplies manufactured by them, copy of which will be mailed to any of our readers on application.

When writing to advertisers, please say that you saw "ad" in the Clay Worker.

Written for the Clay Worker.

HINTS ON BRICKMAKING.

NO. 4.

BY R. BRICK.

In my former articles, I have spoken principally of construction of works and of various kinds of machinery, driers, kilns, etc. In this, my hints will concern more particularly, practical making of bricks—first, preparation of clay for moulding.

Clay dug and thrown up in the bank and left exposed to the action of the weather, will dissolve and be ready for machine with little further preparation. For making by hand or soft mud machine, soak-pits are used; where clay is watered as much as necessary and left to soak over night, it will then temper very well; where it is desired to work direct from bank, it should pass through a pugger or crusher before entering a machine; where the clay is free or loamy, and a soft mud machine is used, a pugger will prepare it for machine.

When a stiff clay machine is used, and the clay is tenacious and hard to dissolve, a crusher or disintegrator is necessary. Where either of these are used, the clay can be carried from them to machine by an elevator, made of strips 3 inches wide by $\frac{3}{4}$ of an inch thick, fastened to two endless detachable link chains running over spugget wheels.

Clay, to make a good brick should be thoroughly mixed and tempered, and free from hard lumps. However small, these lumps cause the brick to check and break in both drying and burning. The reason is plain; in drying, a brick shrinks more or less; a lump of dry clay does not shrink, hence the tempered part shrinks from the lump and leaves a crack; if the whole mass is thoroughly and uniformly moistened, the shrinkage is equal and the brick whole. When a brick has been moulded, the next process is to get the moisture out of it either by natural or artificial heat. The first thing to learn about your clay is how soon it can be dried without injury.

I have seen clay dried by artificial heat in ten hours, without cracking the brick; other clays require thirty-six hours to dry. The result is the same with natural heat; some clay will bear drying by sun and wind in 24 hours, while other clays will not stand sun heat, but must be dried under shed and be protected from the wind for a day or two.

So clay must be dried as it will bear, and no faster. One of the great points in successful brickmaking is to save all you make, lose as few as possible in drying and burning. With good clay, and proper facilities for preparing, drying, and burning, the waste should not exceed two per cent. There is a saying, "a brick is a brick", in other words, rough or smooth, red or yellow. This is a great mistake; there is just as much difference between a good brick and a bad one, as there is between a good egg and a bad one. It affects both the brick maker and the consumer. I have heard men say "I prefer brick to wood for my house, but a brick house is too plain, while I can have a frame house as I

like." This is too often the case, for we know how a house built of rough and poorly burned brick looks. It is true the walls sometimes exhibit a variety of colors, like "Joseph's coat", ranging all the way from a sickly yellow, to a blue black. These colors however are not in regular stripes, but after a modern style known as the "crazy quilt pattern". Such brick often prejudice men against brick for fine houses.

On the other hand we know that a house built of well made, well burned brick, laid in white mortar, trimmed with stone, terra cotta, or fancy patterns of brick, certainly makes a beautiful and durable building, one that will stand for centuries in any climate, and is nearer fire proof than any other frost proof material used in building.

Some object to brick walls, because they are damp. It is well known that hollow walls, with inlets for air at bottom, and outlets at top, will keep the inside of walls dry as any wooden building.

I speak of these things as something a brick maker wants to know, so that he is enabled to meet these objections when offered by his customers. I believe bricks to be the best building material in the world as well as the cheapest. It is plain—it is to the interest of the brick makers to make not only good durable brick but well finished and uniform color. The smoothness and finish depend on careful making and handling. The uniformity of size and color, depends entirely on the burning.

After bricks are dried the next process is to get them into the kilns and set ready for burning. This is another important feature. Good setting is essential to good burning. A good setter with three wheelers, can set from 15,000 to 20,000 per day. My remarks on setting will refer particularly to coal burning and kilns with furnace attachments. I set three and one third brick in a bench, that is, three lengths and one stretcher between eyes; the stretcher to prevent fire from passing from one eye to another through benches; width of eye or flue in kiln, 12 inches; benches, 9 courses; first length next flue; 3rd, 6th and 9th courses tight; intervening courses loose; middle bench all loose with 3rd, 6th and 9th courses stretchers, to allow heat to pass up freely into the body of the kiln; 10th, 11th, 12th and 13th courses projecting or overhanging—all bricks in these, having at least $\frac{1}{4}$ inch space between brick back of overhangers, with ends matching those next to the fire, to allow heat to pass freely to all parts of the kiln; bricks are set 36 to 44 courses high. I think 40 a good height—as high as convenient to put up and take down.

HOLD TO YOUR TRADE PAPER.

How do you read a technical paper? By running down the columns to see if there is something sensational to "catch your eye," or that specially interests you? If you pursue this course you lose the money you paid for the paper. There is nothing in a well conducted technical paper which is not of value. All may not be equally interested in certain topics or subjects, but there is some-

thing for all, and "information" is a very elastic word. It covers all things useful; and to keep up with the times one should read a paper carefully. A properly conducted technical paper is a hand-book of the period and time in which we live. It sets forth current practice in certain branches of mechanics, or engineering, or other trades that support it, and it is the only vehicle for conveying technical knowledge in an easy assimilable form. There are times in trade when there is next to nothing doing, and though the publishers scan the horizon and immediate surroundings closely, little presents itself worthy of note. Then the paper is dull and the publishers are as well aware of it as the readers are; but in the course of the year it must be either a poor paper or a poor reader that does not give or obtain the value of the subscription. Hold on to your paper if you would keep up with your trade.—*Mechanical Engineer.*

BETTER TIMES AHEAD.

Political economists tell us that the most prosperous periods are separated by intervals of ten years. The seasons of the lowest depression are separated by the same term. Thus 1870 and 1880 were years of the highest prosperity and 1874-5 and 1884-5 of the greatest stringency. From this we may infer that the present year is the beginning of a change from a decline to an advance and that times will be better for at least three or four years to come—and then the wheel will descend.—*Ex.*

NEW INVENTIONS.

The following is a list of patents appertaining to brick, tile, terra cotta, sewer pipe, pottery, etc., and the machinery used in their manufacture, issued since our last issue:

- 330,002. Brick Machine—S. Daly, Metropolis City, Ills., assignor of one-half to W. O. Towle, same place.
- 330,291. Machine for moulding plastic materials into brick, etc.—Brightmore & Dixon, Philadelphia, Pa.
- 330,691. Clay Cutter and Pulverizer—W. N. Graves, St. Louis, Mo., assignor of one-half to the Hydraulic Press Brick Co., same place.
- 330,724. Mole ditching, tile forming and wire laying machine—S. Montgomery, West Toledo, Ohio.
- 330,953. Brick machine—A. B. Woodward, Nashville, Tenn.
- 330,957. Glass or vitrious facing for brick fronts—W. Butler, Pittsburgh, Pa., assignor of one-half to J. H. Blair, same place.
- 331,391. Brick or tile die—J. L. Friend, Perrysburg, Ind.
- 331,420. Brick machine—P. B. Mathiason, St. Louis Mo.
- 331,500. Tile section between walls, joists, etc.—W. F. Higgins, San Francisco, Cal.
- 332,126. Ditching and tile laying machine—J. C. White, Swatara, Pa.
- 332,129. Brick making machine—J. H. Williamson, Topeka, Kas.

NEWS AND TRADE NOTES.

Charles Nicoli, designer and engraver on wood, of this city, is making another large cut for Messrs Nolan, Madden & Co. It will be a companion piece to the handsome cut which that firm have been running in the Clay Worker for several months past and Mr. Nicoli, who is a thorough master of his art, promises us that it will be equal if not superior to anything in its line. If completed in time, it will appear in our next issue.

We call special attention to the advertisement of Fred Herrmann's Flower Pot Machine. It is a child of mother necessity and is a boon to all engaged in the manufacture of Flower Pots. It is simple in construction and can be operated by any intelligent man or boy. We have seen the machine at work and believe it to be all that Mr. Herrmann claims for it. Write him for circulars mentioning the Clay Worker.

Messrs Evens & Howard have been improving upon an extensive scale their large clay factory property. A new railway side track has been put in, and three large sheds, probably of an average depth of 50 feet, and each 200 feet long, have been erected for the storage of coal, material and products. The establishment is considerably behind orders for a number of sizes of sewer pipe and will likely be busy for two or three months to come.—*Age of Steel.*

The Hamilton-Brown Machine Company of St. Louis are placing a line of clay-working machinery of the Wallace make in the works of Messrs. Blackmer & Post. The outfit consists of a large clay crusher and pug mill, for mixing and blocking clay for sewer pipe machines. The late shipments of the company embrace a brick and tile machine to Kansas City, one to parties in Illinois and a steam brick machine to Stanberry, Mo. In addition they are preparing to ship a steam brick machine and pug mill with boiler, engine and all necessary outfit complete, to Kansas City.

C. & A. Potts & Co. This enterprising firm are erecting works on West Washington street, in this city for the manufacture of the Potts' Disintegrator and Tile Mills. The demand for their machines has been so pressing that they have been compelled to increase their facilities for manufacturing them. The new works will be fitted with the best machinery and add another improvement to the manufacturing interests of this city. The proprietors are expecting the arrival of their new machinery and when received it will be placed in posi-

tion at once. The works will be in full operation in a few days.

George Burnham & Sons, of Milwaukee, Wis., one of the leading brick making firms of the Northwest, report a good trade during the past season. They run ten soft mud machines of their own make, each machine having a capacity of 32 to 33 thousand brick per day. They use both the Penfield and the Wallace Clay Crushers and Stone Separators, and are well pleased with them. There is a large demand for their brick, but prices are low, about \$7 per thousand for common, and \$15 to \$20 for pressed brick, delivered. This firm have been making brick for 16 years, the senior member having made brick by hand in 1844.

The Michigan Brick & Tile Machine Works.—A recent visit to these works, leads us to conclude that the proprietors, Jas. F. Clark & Co., of Morenci, Mich., are making very satisfactory progress in the introduction of their machinery. Their work is well spoken of. They have recently completed eight machines ordered for the manufacture of Terra Cotta lumber, at different points. They manufacture a full line of clay working machinery (See their advertising page) all of which is tested in their own yards, which is an additional proof of merit. To this, is added commendations of those who use their machinery.

There is building in Washington City a sewer which is larger by 7 feet than any other sewer in the world. In its smallest part it is larger than the largest of the sewers of Paris. For over 2,000 feet is a circular sewer of 22 feet in diameter. There is connected with it a sewer 5,000 feet or nearly one mile in length, of 20 feet in diameter. A fully equipped palace-car, locomotive and all, could run through without difficulty. This enormous sewer is intended to drain the immense water sheds lying to the north of the city. Besides that, it will carry to the eastern branch of the Potomac all the contents of the smaller system of sewers in the northern part of the city. It will take probably a year to complete the work. The boundary sewer, with its connecting systems, will cost when completed, over \$700,000. At present the excavation is made by ma-

chinery operated by steam power, which lifts the dirt out and lands it on the completed part of the work by a system of cables. The same cables also are used in lowering the bricks and cement to the workmen.—*Ex.*

HOTEL PALACE, Springfield, Ill., J. Block, proprietor, for years past one of the leading hotels of that city, is being rebuilt and will be newly furnished in time for the coming convention. It will be fitted with electric bells, steam heat, tiled floors and all the modern conveniences of a first class hotel. Rate, \$2.00 per day, same as heretofore, and as in former years, a special rate will be made those attending the Tile and Drainage Convention. All who have stopped at the Palace in times gone by, will be glad to renew their acquaintance with the genial proprietor and make the Hotel Palace, headquarters during their stay in the city.

NEW ADVERTISEMENTS.

- A. M. & W. H. Wiles,
Brick Makers Supplies.
- Fate & Freese,
Tile Machinery.
- T. C. Gurney,
Brick Machine.
- Fred Herrmann,
Flower Pot Machine.
- W. A. Eudaly,
Brick and Tile Kilns.
- Turner, Vaughn & Taylor,
Clay Working Machinery.
- Westinghouse Machine Co.,
Automatic Engines.
- Vinton Iron Works,
Tile Machine.
- Chambers, Bros. & Co.,
Brick Making Machinery.
- Wallace Mfg. Co.,
Clay Crusher & Stone Separator.
- Raymond & Pricer,
Clay Tempering Wheel, etc.
- Godey's Lady's Book,
Monthly Magazine.
- Scientific American,
Weekly Newspaper.
- Indpls. Decatur & Springfield R. R.
Wanted, For Sale, Etc., Etc.



THE CLAY-WORKER

VOL. IV.

INDIANAPOLIS, IND., NOVEMBER, 1885.

No. 5.

Written for the Clay Worker:

THE USES OF CLAY.

BY PROF. R. T. BROWN.

Except the making of stone implements, the manufacture of vessels from clay is, perhaps, the oldest of human arts; and yet this invention is constantly developing new properties in clay, and new uses for that material. The properties on which the chief value of clay depends are its great cohesive attraction for water and its property of acquiring intense hardness under high heat. The first of these properties gives its plasticity—a quality which we have considered in a previous paper, but we allude to it now to note an apparent paradox. The greediness with which clay seizes on water and the tenacity with which it holds that fluid would suggest its ready solubility, and yet it is entirely insoluble. This remarkable property enables the workman to make a plastic mortar of any desirable hardness, while at the same time he can purify his clay from any soluble substance it may contain, by washing it in water and suffering the clay to be slowly deposited, while the water, holding the soluble substances in solution, may be drawn off. In the same manner clay can be separated from small pebbles and coarse sand, by pouring off the water holding the clay in suspension, a few minutes after its thorough agitation, leaving the sand and coarser substances behind. But the chief value of clay is derived from its property of acquiring a high degree of hardness by heat. On this property depends the art of making bricks, tiles and terra-cotta ornaments, as well as the whole art of pottery, now embraced in what is technically called Ceramics.

As the first use of clay, in point of importance, and that with which we are most familiar, we introduce the subject of

BRICKS AND BRICK-MAKING.

The art of using clay as a building material carries us back into the prehistoric ages. In Chaldea, in Italy, in Asia Minor and in India, brick foundations of houses and city walls have been

discovered of which neither history nor tradition has preserved even a trace. In the rainless climates the brick work of the early ages was chiefly the adobe, or sun dried brick, though it is evident that the Egyptians at a very early period understood the effect of a high heat in hardening clay; for burnt brick are found in the most ancient foundations.

But that the brick which the Hebrews made in Egypt was sun-dried, we infer from the use of straw in their manufacture, and it is probable that the treasure cities of Pithom and Raamses which they built for Pharaoh were constructed of the same material. Well dried clay when protected from the direct action of the rain has a wonderful power of durability; as we see in the adobe houses of Mexico. Even in our damp climate we have seen the clay chimneys out-last the cabin they served.

But thoroughly burnt brick is mentioned in the earliest post-diluvian record of the race. It is written of the sons of Shem, when journeying from the East, they reached the fertile plains of the Euphrates, they said: "Go to, let us make brick and burn them thoroughly. And they had brick for stone and slime (bitumen) had they for mortar. And they said, Go to, let us build a city and a tower whose top may reach unto heaven". (Gen. xi, 3.) The ruins of the tower of Belus, supposed to be the same here alluded to, as modern exploration has shown was built solid—the outer wall composed of hard burnt brick in a good state of preservation, but the center was filled with unburnt bricks which still retain their form but crumble on exposure to a moist atmosphere.

The most wonderful piece of brick work ever made by human hands, if we may believe the ancient historians, was the wall of Babylon. This work was 200 years in construction, employing the surplus labor of a vast empire. It surrounded a square of 15 miles on each side, making a wall of 60 miles in length, 80 feet thick and 300 feet high from the bottom of the moat or ditch that surrounded it. This structure is described as being composed of hard burnt brick,

but the investigation of modern antiquarians indicate that only the outer, or exposed part of the wall was made of burnt brick; the center being filled with adobes, but all were laid in a cement of bitumen and fine sand. Herodotus, the father of Greek history says that on one of the brick pyramids of Egypt, (several of which remain to this day) there was an inscription which he renders thus: "Do not undervalue me by comparing me with pyramids of stone; for I am better than they, as love excels the other gods". The Greeks well understood the value of brick and the art of making it of a good quality. Several of the ancient temples of Athens, and that part of the city wall facing Mount Hymettus were built of brick. Pliny, the historian says that all the brick used in public edifices in Athens were required to pass an inspection by the magistrates before being used. The Romans understood the art of making and burning brick perfectly, as the bricks in the baths of Caracalla and Titus bear witness today. The stone used in the Colosseum is not as well preserved as the brick of these baths.

The ancient Roman walls and forts in Great Britain show an article of bright red brick, hard burnt and well preserved, while the stone used in these structures has nearly all disappeared.

In India and China the art of brick making is of high antiquity, and the product of great beauty and durability. The Chinese have a method of facing their front brick with porcelain which is highly ornamental. The ancient Peruvians carried the art of brick-making to a high degree of perfection. With them it appears to have been an original art. Prescott says that Peruvian bricks were made in imitation of large blocks of stone, and yet were thoroughly burnt to their centre.

In modern times, Holland appears to have preserved the Roman art of brick-making better than other European nations. Specimens of Holland brick may be seen in many of the old Dutch houses of New York. They were brought over from Holland as ballast, and were a

better and cheaper building material than could be produced in "New Amsterdam" at that day. The centuries that have passed have made no impression on them even in that severe climate.

But the marvelous feature in all these wonderful instances of brick-making is that the work was executed exclusively by hand. Even the tempering of the mortar was done by treading with human feet. Subsequently horses and oxen were substituted in this part of the work. The writer of this remembers distinctly of seeing oxen treading mortar in the clay pits at the Cincinnati brick yards, in the second decade of this century. The first advance from this was the tempering wheel traveling around a centre in the clay-pit, and drawn by a horse. Following close on this came the pug mill, which is now in use; but brick machinery of any kind scarcely dates back of the present century. As early as 1840 however, a million of bricks were made by machinery and used in arching the tunnel for the Whitewater canal at North-bend Ohio. They were pressed from untempered clay on rather a rude machine, but the brick promises a fair durability.

Since this experiment numerous efforts have been made and many patents have been obtained for making brick by machinery; most of which however, have failed for want of a proper understanding of the nature of inelastic substances under pressure. But notwithstanding these failures, a good degree of progress has been made and several important points have been gained in the working of clay by machinery. A good article of brick, fully equal to the best made by hand moulding is now produced by machinery at five or six times the rate of the most rapid hand moulder. Another important point gained is in working the clay stiffer than it is possible to work it by hand. This saves spreading on the yard and much of the risk of damage from weather. It also makes practicable the drying of the newly moulded brick by artificial heat and enables the brick maker to work at all seasons of the year.

Some advance has been made in the better distribution of heat through the kiln, in burning so as to secure a uniform grade of brick in every part of the kiln, as also in the economy of fuel. The whole subject of machine brick making and burning is, as yet in its infancy; but enough has already been done to warrant an assurance that before the close of this century, hand-making of brick will be a thing of the past; and

that brick will ultimately be made so rapidly and at so low a price, that it will become the uniform material for all classes of buildings in this country, and perhaps throughout the civilized world.

But our space is exhausted, and we adjourn the subject for a month.

Written for the Clay Worker:

TRADED A BRICK-MAKER FOR A MERCHANT.

A Story of Real Life.

Every reader of the Clay Worker has a life history full of interest to himself—the actor in the drama.

Looking back upon the pathway of our life journey, we call to mind the many incidents that have made their impressions upon our memory. Some of these recollections are welcome tenants of the mind—others come trooping in on us that we would gladly bid a final adieu. The hopes and fears, the successes and failures of the past rise up in our memories in swift review. We see many things upon the records of the past in our own lives that we would gladly mend, if we could; but alas! the record is made up.

The clay in our hands to-day, in a plastic state may be wrought into any form almost but when baked its form is fixed. So like our lives, to-day we may do and be, but the plasticity of to-day, is a hard finish to-morrow that no amount of effort will work into a plastic state again.

The lives of men do not run in the same groove—our experience is not the same. I have had an experience in my life that no other reader of the Clay Worker ever had and probably no one of your numerous readers ever had a similar experience. It is not an experience in clay working but an experience growing out of being a *clay worker*—it is a *love* story. Some of the old readers of the Clay Worker may have come to the point (I will not say age, for I am in the fifties) when the warm love of their youth is forgotten; but I have not.

From my youth up, I have been a "clay worker." (Mr. Editor, before I enter upon my story I feel that I must tell you how I like the name of your publication, "The Clay Worker". It covers the clay working interests so fully that the name honors the clay worker of high or low degree. I like to repeat the name "Clay Worker".)

Now I will give you my story. As I was saying, "from my youth up I have been a 'clay worker'". My father's old brick yard in the suburbs of the old county town of C—in your State, is fresh in my memory. When but a little

boy I was put to off-bearing for my father. I soon learned to do it well. I tripped back and forth many a time during the day—kept my molds clean and sanded—taking care to do my work speedily as well as carefully, my good reputation as a handy worker, though a boy was soon well known among my acquaintances. During the winter season I attended the school near by. In those days the schools were run on a subscription basis. I was not much more than in my teens until I had selected my sweetheart out of the girls attending school; indeed to tell the whole truth I had two, but one was my "brilliant" and the other, "gold in the lump."

My "brilliant" was Carrie B——. She was pretty as she could be, sprightly, quick in repartee, and brimming over with fun alive, ready to romp and play and acknowledge the gallantry of the town youths.

The other, "gold in the lump" was Mary F——. We never called her a pet name, it was plain "Mary". Mary was the best scholar in the school, the best speller—and that went for a great deal in those days. She had soft blue eyes, fair complexion, auburn hair a little inclined to wave and curl; she had a sweet disposition and retiring manners. It was the custom at that time the scholar who "quit head" at noon or in the evening, went foot when the class was next called; and I remember when Mary was at the foot of the class, or below others in the class, and caught and spelled a word that others above her had missed, she passed up to her place with head slightly bowed and with a look which said "by your permission". I admired Mary for her goodness and fairness in everything she undertook, yet Carrie was the brilliant prize to be won.

Along the years, up to the age of eighteen, my summers were spent in the brick-yard, and the winters in the school. Carrie, Mary and I were together in company with others, like neighbors children generally are, but on all suitable occasions I was Carrie's gallant, from the spelling schools and all kinds of "be's". But "every sweet has its bitter". There was one Mark Brown, the son of a store keeper in the town, that occasionally interfered with my peace of mind. He was better dressed than I, and in those days to be the son of a store keeper was to be a pretty considerable somebody. Mark's habits were not the best, but they did not seem to be in the way at all, for he was well received in society. When Carrie paid

attention to Mark, I would go with Mary. In this see-saw way we passed the time until I was eighteen. About this time it was reported that Mark Brown was going down to Cincinnati, to complete his commercial education, and I received the news with pleasure. In a short time his departure was an important event in the town, and I felt that the coast was clear. But in a few weeks after Mark went, my father died, and I being the only son and having two sisters younger than myself, I very naturally assumed the management of the business, aided by a very blessed mother. I continued my father's business. The greater responsibilities assumed, gave me less opportunity to see my lady love, but she expressed much sympathy with me in the loss of my parent and I felt the greater attachment for her.

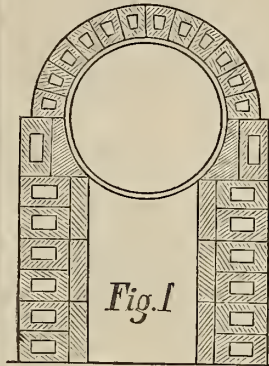
Both Carrie and Mary frequently visited my mother and family. Carrie was understood to be my sweetheart and quiet Mary the confidant. I gave strict attention to business, which added to my general reputation, and things run smoothly until I reached the age of twenty. By this time I was well known in the town and run the only brickyard of the place. Carrie and I became engaged and it was generally so understood. It was agreed between us that our marriage should be postponed a year with the understanding that I was to build a brick house and thus provide a suitable home. We talked and planned for the future and I, for one, felt that it was real. But Mark Brown returned home, a finished City gentleman. He was the star of society on all occasions, and made it in his way to pay special attention to the object of my affection. Carrie assured me that it was all for mere acquaintance sake, nothing more, never.

CONCLUDED IN OUR NEXT.

TERRA COTTA LUMBER JACKETING, For Furnaces, Steam Boilers and Pipes.

The files of the patent office, evidence, that of late years' inventive talent has been stimulated to no inconsiderable degree in the production of methods and devices for the economical handling of steam—that important medium for the transformation of heat into labor. Improved fuel combustion apparatus for its generation, ingenious devices for restraining its waste, and methods of retaining the heat used in its creation, all figure prominently toward a common end. It is of the latter economy which this article has to do. The conduction of

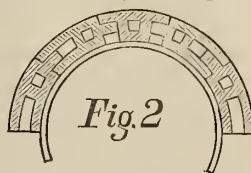
heat refers to its transmission from one part of a continuous and homogenous body to another part of the same body; or, its transmission from this uniformly heated body to others, by contact or radiation.



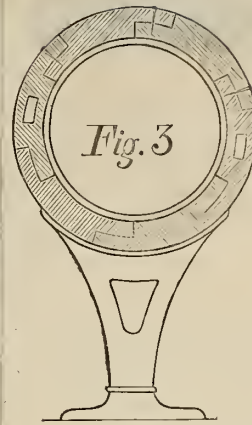
something less; showing that this conductivity does not necessarily depend for superiority upon the density or specific gravity of the body, through which the heat is transmitted, as might naturally be supposed. Greater conduction powers are exerted in liquids by high than low temperatures, and when there is no convection of heat in liquids, by which heated particles are carried from one point to another, the conducting power of liquids is very small. That of water, say, only about one one-hundredth that of copper, that of air still feebler, estimated at one one-thousand-four-hundredth of lead, and that of gases, none absolutely distinguishable.

The intensity and volume of heat, transmitted by radiation, depend not only upon the temperature of the radiator, but upon the *temperature of the absorbent and the nature of its surfaces*. Hence, the settings and coverings of steam boilers and other heat receptacles should be of a character which will not only resist the action of heat, but will serve to prevent its dissipation through radiation and conduction. Walls of common building brick, their fire surfaces faced with fire brick, accomplish the first purpose, and are universally used in the erection of furnace arches, but their heat conducting properties rank next to

metal. Boiler coverings and surroundings are made of materials, or a combination of materials, possessing poor properties of heat conduction, but combustible under certain provocation, a defect sought to be shielded by the interposition of layers of clay or asbestos (themselves capable of assuming a red heat) between them and the heated sur-

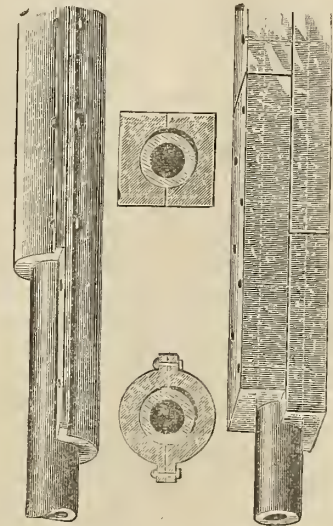


Upon the temperature & conductivity of these bodies depend the speed and power of this transmission. Rating the conductivity of silver as 100, copper is 73.16, gold 53.2, iron 11.9, steel 11.6, lead 8.5, and platinum



faces. Terra Cotta Lumber is a material combining the two qualifications sought for, as refractory to heat as bricks, and in its conduction, as inferior to air as air is to lead. As compared with building brick, its cost of manufacture is no greater, its weight sixty per cent less; does not warp in drying & burning; hence

may be moulded in very large forms, and after burning may be reduced to exact shapes by using the same edged tools and saws employed in working wood. This latter qualification, with the capacity of the material to receive and hold nails, enables a much neater and effective job in furnace and boiler coverings, than is afforded by many of the methods now in common use.



The preceding cuts illustrate the manner of application, for which patents were granted the present month to C. C. Gilman, of Eldora, Iowa, the inventor of the material itself.

Fig. 1 shows the covering and setting of a steam boiler with blocks of terra cotta lumber, varying in form and cemented together. The furnace exposure being faced with tiles of fire clay. Figs. 2 and 3 exhibit methods of applying these blocks, sawed and mortised to true bearings, to partial or entire surfaces, and fastening with spikes or nails, no cementing bond in the joints necessarily being used. Fig. 4 illustrates a steam pipe covered with sectional tubes of the same material. Further information is afforded in advertisement on another page.

THE CLAY WORKER

INDIANAPOLIS, IND., NOVEMBER, 1885.

Entered at the Post-Office, at Indianapolis, Indiana, as second-class matter.

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ADVERTISING RATES FURNISHED ON APPLICATION.

Correspondence on all subjects of interest to Clay Workers is invited. Communications from practical men will always be welcome. Address all communications to

T. A. RANDALL & CO.,

25 Thorpe Block . . . Indianapolis, Ind.

THANKSGIVING.

As we go to press so near the time set apart for thanksgiving, it is meet that we be not unmindful of the blessings which have come to us during the year, and like other good people make acknowledgement. As a publication the Clay Worker has had a prosperous year. Like a healthy robust child, born in due time, it has made a splendid growth, increasing in size with the increase of patronage. The Clay Worker has added to its list a large number of subscribers, and the advertising patronage has steadily increased, and that too of the best business in the line. To-day we have the entire country for our field. Our circulation has extended into every state and many of the territories. We have made a wide acquaintance and a very satisfactory one. We are especially thankful for what we have attained unto—and for the prospects before us. We have the satisfaction of knowing that in a quiet way, with malice toward none, and with charity for all, we have kept steadily on our course, striving to fill our measure full to overflowing with helpful thought and practical suggestions fresh from the clay workers.

PROUD OF OUR WORK.

We take much pleasure in the study and advance of the great clay working interests of the country and we are especially proud of being able through our columns to effect so general an exchange of practical ideas among clay workers. Our readers will observe that in this number of the Clay Worker, there are a number of very practical communications, and still there are "more to follow" already in hand. The amount of original practical matter published in our columns, has served to call out from our readers some very flattering commenda-

tions—in return we wish to thank them for their words of cheer, and assure them that we appreciate the very substantial encouragement which flows in upon us from all sides.

THE COMING CONVENTIONS.

The Indiana Tile and Drainage Association will be held at Indianapolis, Tuesday and Wednesday, December 8 and 9, 1885.

The Illinois Tile, Brick and Drainage Association at Springfield, Ills., Tuesday and Wednesday, January 19 and 20, 1886.

The Iowa Tile and Drainage Association at Des Moines, Wednesday and Thursday, February 3 and 4, 1886.

The Ohio Tile and Drainage Association at Columbus, Tuesday and Wednesday, February 9 and 10, 1886.

The Michigan Tile Brick and Drainage Association, at Flint, Mich., Tuesday Wednesday, March 9 and 10, 1886.

NEW PUBLICATIONS.

N. Clark & Sons, San Francisco, Cal. are out with a 68 page illustrated price list of Sewer Pipe, Drain Tile, Fire Brick, Well Tubing, Chimney Pipes, Stone Ware, Flower Pots, Vases etc. manufactured by them. The illustrations are nicely executed and the matter well arranged making a very creditable catalogue.

Turner, Vaughn & Taylor, Cuyahoga Falls, Ohio., whose advertisement appears in this number, have recently issued an illustrated catalogue of their clay working machinery and will be pleased to send a copy to any of our readers. This is an old and reliable firm. They have been giving special attention to the manufacture of clay working machinery for more than 20 years and are now prepared to furnish the very best machinery on the most favorable terms.

We have received a copy of the American Newspaper Catalogue for '85 and '86 published by Edwin Alden & Bro., Cincinnati, Ohio. It contains a carefully prepared list of all the newspapers and periodicals in this country arranged in a form very convenient and get-at-able. It is a very handsomely bound book of some 1000 pages. Sent prepaid on receipt of \$1.50. Address Edwin Alden & Bro., Cincinnati, Ohio.

ITEMS.

The Decatur (Ill.) Tile Co., have commenced to build additions to their brick and tile sheds, in order to increase their capacity for making their excellent brick.

It is announced that a very fine clay for pottery purposes has been discovered in Lincoln Parish, La.

The American Sewer Pipe Co., of Akron, Ohio, has been incorporated to manufacture sewer pipe. Capital stock, \$50,000.

Jones, Denton & Co., contractors on the new aqueduct for New York, report that they recently ran a Westinghouse engine and a Ball dynamo thirty-six days without a stop, in lighting their tunnel work.

The Eureka Machine, recently exhibited at the Great St. Louis Exposition, is now up and working practically on the Champion Brick Yard, in St. Louis, Mo. Brick makers who contemplate buying machinery for the season of 1886 should not fail to go and see this machine before the end of the present season, which will be about the first of December.

Chambers, Bros. & Co. write that they have just completed a new forge shop and have added some new heavy tools for their brick machine department. They recently made a car load shipment to Nebraska and will send another to Georgia in a short time.

The Westinghouse Machine Co., are still further enlarging and improving their works. They are building a furnace to be fired with natural gas, and are erecting a steam hammer for the die forging of their connecting rods from mild steel. They are also building a brass foundry for the production of their own castings. Natural gas has been introduced throughout the works.

The Iron City Brick Works, Sheffield, Ala., C. W. Barrett, sec'y., on September 1, began the manufacture of plain and pressed brick. Their maximum capacity will be 40,000 every ten hours. They will mould the brick from watered clay, tempered exactly the same as potters clay. The company will use the improved Sword machine, with crushers, carriers, represses, and every modern appliance for making brick strong and perfect.—*Building Trades Journal*.

Brick and Tile Makers desiring to attend the Indiana Tile and Drainage Association to be held in this city December 8 and 9, can secure certificates for excursion rates by addressing J. J. W. Billingsley, Sec'y, Indianapolis, giving the name of the railroad over which they will come. All who can should come. It will be time and money well spent.

HINTS ON BRICKMAKING.

BY R. BRICK.

How shall bricks be burned? Hard of course; but what process will insure the greatest per cent. of hard brick? There are several kinds of kilns. First, the old fashioned Casing kiln, 9 inches thick; which is put up and down with each kiln burned. The fuel is burned in the arches of the kiln and in contact with the brick—all wood, or wood and coal together are used. Then there are permanent walls from 16 to 24 inches in thickness, fuel is burned in same manner as in first kiln mentioned. Then there are patent kilns where furnaces and hot air chambers are attached to main walls, the fuel being all consumed in the furnaces, and only flame and hot air come in contact with the brick. Of these, the Wingard, better known as the Calorific, is best known, and is in general and successful operation in many parts of the United States. These kilns have been in use for more than 10 years. There are also the McCue, and Eudaly kilns, similar in construction but not so well known. Then there are crown top, down draft brick kilns, such as the Hoffman.

The old Casing kiln has many objections. First, the labor of building and taking down the wall at every burn; again the walls being light, the fires cannot be controlled, hence there is a large per cent. of Salmon brick in corners, ends and sides. The fuel being directly under and in contact with the brick melts a great many; the ashes that accumulates while burning, prevents from burning hard enough, then sudden expansion and shrinkage, caused by rapid changes of temperature, cracks many of the arch bricks, also requires more labor to fire the kiln.

The kilns with permanent walls, without furnaces, save labor of building wall each burn; the walls being heavier the per cent. of soft brick is less, otherwise it is open to the same objections as first kiln.

Kilns with furnaces attached, obviate all these difficulties. The arches of these kilns are kept at uniform temperature. no fuel comes in contact with them, and with proper management the arch brick are all whole and sound, and good color; the waste in kiln is very slight. Again, labor costs 50 per cent. less, and a cheaper quality of fuel is used; slack coal or nut coal, being used with success. Reckoning saving in waste brick, fuel and labor, also superior quality and value of brick burned, makes these kilns almost indispensable to the brick manufacturer. While these kilns are a grand improvement over all that have preceded them I believe there is still room for improvement; that is, perfecting this principal and strengthening all weak points. In this I only speak of kilns for brick; there are others for burning tile, queensware, pottery, etc.

The kind of fuel to be used:

For water-smoking, either wood or coke should be used. Which is cheapest, depends on locality; I think where good wood can be had at \$2 per cord or coke at ten cents per bushel, the cost will be nearly equal. For finishing or settling kiln, either good hard wood or coal is used. In the ordinary kilns wood or coal is used; in kilns with furnace attachment, nut coal or coal-slack is used; where cost of good coal-slack does not exceed \$1.50 per ton, it is cheaper than good coal; cost of slack at mine is nominal, the principal cost being freight.

The burning of brick is certainly the important part of the manufacture; unless they are well burned all previous labor on them is lost; they may be perfect in shape and finish, but almost worthless if not properly burned; the money is made or lost at this stage of the manufacture. I think there have been more failures on account of unsuccessful burning than from all other causes, hence any one embarking in brick making who has had no practical experience should by all means secure the services of a competent burner. Make a success of this department and I have no fears that the difficulties of "making" can soon be overcome. One thing essential to good burning is good setting, brick must be set in kiln properly, or the burner cannot burn uniformly; the spaces between the brick should be uniform, and in setting "benches" and "overhangers," or perfecting "courses" in arches, care should be taken to allow space for heat to rise freely to the body of the kiln, through "overhangers" as well as "benches". There should be no tight "courses" in kiln above the "benches". There should be at least $\frac{1}{2}$ inch space between bricks in all parts of the kiln.

NEW INVENTIONS.

The following is a lists of patents appertaining to brick, tile, terra cotta, sewer pipe, pottery, etc., and the machinery used in their manufacture, granted since our last issue:

- 327,569. Brick machine.—G. Martin, Milwaukee, Wis.
- 327,711. Machine for sanding brick molds.—A. Naylor, Cold Springs, New York.
- 327,867. Brick Machine.—L. Deraelle, Cheltenham, Mo.
- 323,194. Cut off table for tile machines.—C. W. Crawford, Brazil, Ind.
- 328,551. Machine for making paving or building blocks.—A. Ward, Camden, New Jersey.
- 328,552. Machine or Press for pressing bricks, etc.—A. Ward, Camden, N. J.
- 328,756. Device for disintegrating clay and separating stones therefrom.—J. A. Boyd, Minneapolis, Minn.
- 329,0606. Pottery press.—J. S. H. Lovett, Trenton, N. J.
- 329,246. Machine for laying drain tile.—O. W. Nan Denburgh, Schuylerville, New York.
- 329,373. Kiln for firing decorated china.—E. Detwiller, Milwaukee, Wis.
- 329,415. Brick Machine.—R. N. Ross, St. Louis, Mo.
- 329,708. Clay Pulverizer.—J. A. Boyd, Minneapolis, Minn.

CORRESPONDENCE.

Experience in Brick Making Around Chicago.

Editor Clay Worker:

To be candid it will take less time and paper to tell what I know than what I do not know, but I want to learn.

Ten years ago I thought I had little or nothing to learn; now, I know that I have simply the rudiments of a brick makers education.

The difficulty with us is that we are too opinionated and egotistical, but year after year we are confessing our mistakes by adopting plans and methods that we have laughed at. We go about among our neighbors and ask questions, read the Clay Worker and other periodicals devoted to our interests, make tests and experiments and in various ways recognize the fact that we still have something to learn.

In this City there has been a marked improvement in the qualifications deemed requisite to make a successful, practical brick maker. This change has been gradual and dates from 1871, the year of the Chicago Fire. Many of our most successful and enterprising Manufacturers, are the sons of the early pioneers in the business. They are young, active, enterprising, full of push, energy and ideas. They have an experience dating almost from their birth, added to a general education and acquirements superior to their fathers. Fifteen years ago there was little system in vogue among us. Book-keeping consisted of a time book and few penciled memorandums. Now as a rule we keep as complete a set of books and have our business as well organized as any in the City. Not only this but there has been a marked improvement in our methods of manufacture and quality of product.

All around this City is a substratum of tough blue clay, easily worked and burned into a durable, serviceable brick. In color they are a dirty gray, but are strong and vitrify with ordinary burning in from five to six days. The only drawback is the prevalence of small lime stones. This of course precludes the possibility of making front brick or one that it would be profitable to re-press. There is no question but that in time a process will be discovered that will thoroughly eliminate the stone from the clay and enable us to make a common building brick unequalled for everything but looks. Notwithstanding the assertion above made that a front brick can not be made from Chicago clay, hundreds of thousands of dollars have been spent in attempts to disprove it. One company alone spent \$175,000.00 before fully satisfied. Messrs Anderson & Frost who have since achieved such remarkable success with other clay, spent nearly two years of time and lots of money convincing themselves that Chicago clay was fit for Common brick only. In and around Chicago are the deserted ruins of seven large brick yards, costing originally not less than \$500,000.00. Some have been dismantled and the costly machinery sold for old iron. Some still have buildings filled with engines, machinery, etc., but all of them are

monuments to the folly of visionary fools and willing dupes of smooth talking adventures. It is to the credit of our Chicago brick makers that no one of our guild has ever been connected with one of these swindles. The time will come, if it has not already when investors of capital in brick making will insist on some guaranty for success.

The history of all these failures proves that they were entirely due to a lack of business experience and that their projectors were utterly devoid of common sense. Our clay can be successfully worked on any machine I have ever seen except a dry press. What I mean by this is that we can make a good durable building or sewer brick capable of standing exposure and sustaining great weight on the Martin, Kuisely, Quaker, Eagle, Chambers, Penfield, or any kindred or similar machine. Not that they can be made equally good or equally cheap on all these, but no clay that I have ever seen will suit them all so well as that in this County. The business here during a portion of the summer has been depressed but is now in a prosperous condition. Prices are good and collections fair. Our yearly out put will reach four hundred millions and the prospect now is that they will all be used.

What we want is a better brick made cheaper. I am always ready and willing to impart any information I may have and equally willing to receive from others. Your paper and others should be the means of conveying it from one to another.

Chicago, Nov. 5, 1885. PROGRESS.

A Few Practical Suggestions.

AGUSA, GA., Nov. 11, 1885.

Editor Clay Worker:

Having had my attention called to the White Clay of Missouri, North and South Carolina, as well as Georgia, the question which I am unable to answer still presents itself, since Nature has been so kind to the people of this Country why is it, that with all the means at their disposal, they do not take advantage of it, and use it as nature has intended.

In the states above mentioned we find the finest Kaolin, easy of access, to market, and a market that needs it, still it is not used; this Kaolin is as fine as any of the English or French, still the people who are seeking for a good investment will put their money in some stock jobbing concern, and lose it and let an opportunity pass when they could invest it, and realize a profit.

It may not be generally known, but in the United States there are less than 150 Potteries, to supply the people with table and other ware; where then does the balance come from? The question is easily answered; from England, and France principally, and at a great expense, as the duty is heavy. Now if people who are seeking for investment would look into this business in a careful manner, and with a thoroughly practical man, they would soon be convinced of the fact that the business will pay, and largely too.

What better business than this can a young man go at if he is inclined to

learn a trade; take for instance a moulder, after he has thoroughly learned his trade, it is but little trouble for him to make from \$25, upwards a week. Body and Glaze maker will receive from \$30 to \$50 per week. Who is it in this country now that does this work, and receives the pay? Those who have learned the trade in England principally, and brought it to this country to the shame of our own people. I venture to say that in the 150 Potteries in this country you will not find a single native born American who is filling any of these positions. No, they much rather clerk in some store, or act as book-keeper on a "starve to death salary," than attempt to learn a trade that will always give them work, and big pay.

The business of Casting, Moulding, Throwing, Turning, Jiggering, Handling, etc., is not difficult to learn; it is certainly a fascinating business, for one is making something useful or ornamental from nothing. Generally a young man selects one or the other of these branches of the industry, and learns it thoroughly and follows it; as all this work is done by the "San" or "Dozen", each man gets a certain price for his work, which is usually a standard price.

The art of Body and Glaze making is more difficult to learn, from the fact that no Body or Glaze maker will ever take an apprentice, unless he is a near relative. These are held as great secrets; and I have known one or two instances when the Body and Glaze receipts for "C. C." and "White Granite," have sold as high as \$15,000. Almost any one can learn what composes the ingredients used to make both the Body and Glaze, but to find out the proportions is the trouble; one might try a life time and then be no nearer a first class, strong, fine, but cheap body, than when he first commenced. It is a well known fact with all Potters, and those conversant with the business, that a person who has the receipts for Bodies and Glazes, has that which will always secure him work and big pay.

The finer Bodies, such as Porcelain and Parian, are in still greater demand in this Country, for the reason that but very few have them; all of these bodies however are very simple, and easy to prepare, if one only knows how to do it. Any one who may be so fortunate as to secure a Body, and Glaze makers' receipts, can prepare the bodies as well as he who owns the receipts if he will but follow them in every particular.

Some years ago parties in this Country, and in England, published a small volume, said to contain the various receipts used by Potters. The books had a large sale, but the receipts were worthless, as they did not give even the first principals; the same may be said of a volume recently published, said to contain the Enamel receipts. The theory is all well enough, but it will not work. There are however honest practical parties who will give to those who desire this knowledge and the receipts, and in such a manner, that they can be used by any one, and will give sure satisfaction.

It is greatly to be hoped that parties who wish to engage in a first class Manufacturing business will examine into

these large, and seemingly inexhaustible beds of Kaolin, and use them for making that which will enable the young men of this Country to learn how to make, and benefit the people at large by keeping the immense sums of money that is yearly paid to foreign Manufacturers for Pottery alone.

Trials have been made with this Kaolin, by thoroughly practical men, and it has been found to be every way equal to any in use, and well adapted to not only make Pottery, but "White Brick," "Fire Proofing," Crucibles, Druggists Ware, etc., etc.

"W."

The Savage Fire Brick Works.

Editor of Clay Worker:

This concern which was organized and established in 1871, has grown from a small yard making two thousand "nine inch" brick per day, to its present extensive proportions with a capacity of forty thousand daily. It is now acknowledged to be the largest first class fire brick establishment in America and probably in the world. The works are three in number located at Keystone Junction and at Williams' Station, in Somerset county, and at Hyndman, Bedford county, Pa. The mines are situated at Williams' Station, on the line of the B. & O. R. R. 130 miles from Pittsburgh. The clay is taken from Great Savage Mountains one of the Allegheny Mountain Range. Geologically it lies under the Conglomerate and is mined by drift, it is of a superior quality hard and flinty, the analysis of which is as follows:

Water,	13.02
Silicic Acid,	55.21
Alumina,	31.18
Peroxide of Iron,	.07
Lime,	.18
Magnesia,	.11
Alkalies,	.23
Organic matter and loss,	.00

The vein is from 6 to 25 feet in thickness with roof of solid rock of 100 feet—from 100 to 150 tons of clay are mined daily and the company has never use a prop timber. A curious fact of interest to Geologists might be mentioned in 1876, a piece of charcoal 3 feet long and 10 inches in diameter was found embedded in the clay 900 feet from the mouth of the mine which had over 300 feet of covering.

The works located as above are equipped with machinery of the latest pattern, every thing aiming to the accomplishment of quick work in the best possible way, and their facilities are such at the Williams Station Works that it is possible to mine the clay and in fifteen minutes have it upon the drying floor in the shape of a brick. The clay are prepared by both the wet and dry process. The kilns fifteen in number are the New Castle down-draft kiln 90 ft. stack. The present daily output is from 26 to 30 thousand. The trade extends into nearly every State and Territory in the Union, and always has been good—all during the panic of 1873 and the past business depression this works has kept right on with full turn, no reduction in its force, and with its order book

full. They employ 160 hands and make brick from 6 ounces to two thousand pounds, in any and all shapes desired and thus far have not encountered any order they were unable to fill. It very often happens that after others have tried to execute an order and failed that these works are called upon. They have just completed an order for an eastern firm in which the blocks range in weight from 1,800 to 2,000 pounds; the dimensions of one of these brick is 8 ft. by 24 in. by 9 inches.

This includes, I believe, all the facts of public interest, I might add that the company is now manufacturing a superior Dinas Silica Brick which is giving great satisfaction and is in every way equal to the best Silica brick manufactured abroad, this branch of the business is in charge of Mr. Wm. G. Taylor late of one of the largest works in England.

Black Bros. Stone Ware and Drain Tile Works, located at Meyersdale, Somerset County, Pa. is a concern of no small importance to the town, reports a flourishing business. Their building is 25x100 feet and two stories high. The first floor is used for making and drying drain tile, capacity 40,000 feet per month. The second floor is used for making and drying stoneware, capacity of this branch, 8,000 gallons per month. They have two up-draft kilns and use both coal and wood in burning. This covers the clay interests in this immediate section.

W. S. R.

Somerset Co., Pa.

A Word From Iowa.

Editor Clay Worker:

As I have been in the Brick business over 30 years, I could write enough to make you tired of reading, if time would permit me to do so. I will just say that I am situated in a very favorable place for clay and fuel, but I have to ship my brick to the different towns along the R. R., which is not very satisfactory to myself; \$6.50 to \$8.00 is what I get per thousand for my Common brick. I make a brick also from a mixture of different kinds of clay moulded by hand, and dried in a shed slowly for a few days, afterwards repressed on a Kennedy Dry Press Machine. Also on a Hand Repress, which makes a very fine brick. I sell those at \$20.00 per thousand. I make the white as well as the red color.

I am thinking somewhat of changing my location as there is not much demand in this section for No. 1 brick. I think of going to Des Moines, Ia. I am very well pleased with the Clay Worker; I can well afford to pay \$1.00 for the same. Every brick maker should patronize all such papers as yours, and send in their items quite often. I am trying to make a better brick all the time, and that is the only way to succeed in the business. In the 30 years of brick making, I have never failed to take charge of burning every kiln of brick that I have had made, and some seasons I have run 3 yards, at different places. In burning I use both coal and wood. It is no trouble to get a good burn with either all coal or all wood, to a man that understands how; but there are many things to be considered in burning, and practice is better than theory in brick burning. I have

paid dearly for what I know about burning, especially with coal; but I would prefer coal if I had to start in a new place, especially where wood is scarce and high priced. There are many ways of burning, with either wood or coal. I have tried a good many different ways, although I don't approve of recommending it to any new beginner in the business. But the time is at hand now that brick must be uniform in size and color, in most of our cities and the brick maker must read and keep up with the times, or go West.

Boone Co., Iowa.

J. SLATER.

A Successful Yard.

Editor Clay Worker:

I am now in successful operation having placed my machinery in position. I have been in the business of brick making for 10 years—making by hand. In 1881, I bought a soft mud machine but I was not satisfied with it; I lost too many brick by bad weather. This season I put in a Kells Machine made in Adrian, Mich. It is a stiff mud brick and tile machine and I think it the best in use. I also purchased a Potts Disintegrator in Indianapolis, Indiana, which grinds up anything we throw into it; it is the best machine to disintegrate and temper clay with that I ever saw. With these two machines I can put out 25,000 brick per day, as fine as I ever saw. My clay polishes until the brick shine like glass; the bank will work about 8 ft. deep, and I have enough to last for two generations.

My brick burn a beautiful red color and are quite as good as the Philadelphia for which we pay \$50 per thousand. I burn in common clamps—use heavy sheet iron doors—have large door at either end to back in wagon or cart—kilns, each hold 200,000. My plant is on a slope and every thing from the clay bank is worked down hill; operate works with 30 horsepower engine—engine house 26 by 38 feet, 2 stories high. The Disintegrator is set on the second floor directly over the brick machine—the upper floor is laid with 2 inch plank and have a hopper by the side of which we dump the clay—one man tempers the clay and feeds it into the hopper—the water is forced through 700 feet of gas pipe by means of a wind mill—on the floor we use rubber hose with sprinkler attached for tempering. My dry house is 26 by 80 feet, 2 stories high, joining engine house. The mouth of the brick machine comes out into the drying room so the cutter and off bearers work outside of the engine room. Drying rooms extend to kilns; the kiln sheds are 52 by 120 feet covering both kilns with a 20 by 52 foot hallway between, covered, so we can work rain or shine.

I have invented a new dryer which does so well that I have applied for a patent. With a dryer I can dry my brick ready to burn without loss. I shall side up my sheds and make brick all through the winter and keep comfortable, and the brick from freezing. (Here follows a pen sketched illustration which we cannot well transfer.—Ed.)

I defy all competition for front brick either in color or finish—uniform throughout. I have no bats; they do not break

in handling—have to use a brick hammer to cut them. They will not take up water like other brick. My clay is free from lime, and the brick are not chipped and may be dumped from a cart without injury. I will write you soon giving my experience in burning.

A. J. RAWLINGS.

Montgomery Co. Ky.

The Benefits of Drain Tile.

Editor Clay Worker:

In passing through Paulding Co. in this State, I see a great need of under-draining. Where they have tiled they have lacked in thorough work. I noticed one field of corn not far from a tile yard that was an exception from all others. I enquired how it was. A citizen replied, "that field is tiled—being near the tile-yard, last fall the owner concluded that he would try the experiment of draining it." The experiment is satisfactory, and the same man is now hauling tile to another field.

The owner of that field has every prospect of gathering 65 or 75 bushels of corn per acre. If enterprising farmers would only try the tile in that vicinity they would soon get to using it generally. Corn in the same vicinity on land not tiled looked like it would not yield more than from ten to twenty five bushels per acre. Some of them wanted to know if I thought other lands would be benefited in like proportion. I assured them that they would. John Johnson of Geneva, N. Y., borrowed money to drain and did well by so doing. Where the soil is rich, farmers can afford to borrow money to drain; the increase of the first crop over what it would otherwise be, will often pay the money back.

A LA TOURETTE.

Marion, Ohio.

Brick Making in Alabama.

Editor Clay Worker:

It may interest some of your readers to know what is being done in the South in the way of brick making. It is in its infancy as yet, what the South wants is more brick. We have started this season a yard with a capacity of five millions brick per year, using the Eureka dry press machine, which works perfectly, making a brick not excelled in this country. Our brick burn a brown and grayish color, but are very hard; we sell all we can make, shipping them to other points for front brick, and they command a good price. This young city is growing rapidly and the brick blocks going up would do credit to a city of 50,000 people. The Clay Worker we think a great help to the brick maker; every one should take it.

Colbert Co., Ala.

C. B. CHASE.

In the next (December) number we will publish the first of a series of papers from the pen of an able writer who has been closely identified with the clay working interests of the U. S. for the past thirty years.

NEW ADVERTISEMENTS.

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Wants, For Sale, Etc., Etc.

AN OLD BRICKMAKER'S PRACTICAL EXPERIENCE.

As the Clay Worker is a sort of medium for experiences, I will relate a little of my own experience with your permission.

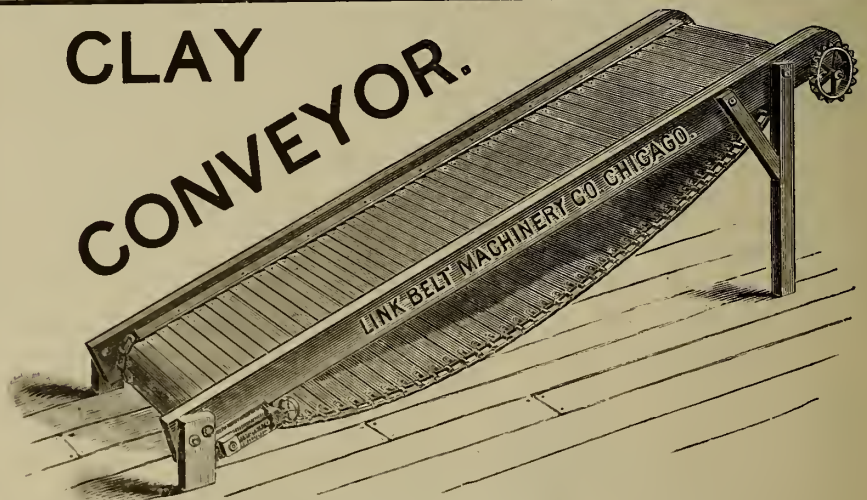
I have been in the brick making business thirty years or more and have used not less than eight or ten different machines, some of them among the most prominent in the market at the present time, and have had various experiences which have cost me a great deal of money. Last Spring I bought of T. C. Gurney of Milwaukee, two of his horsepower machines which have been in use through the season—one on my own yard, and one on the yard of

my brother-in-law. A while ago Mr. Gurney called on me, and as I mentioned the number of different machines I had used and the superiority of the Gurney over others he asked me to state through the Clay Worker my experience with the Gurney Machine, for the benefit of the brickmakers.

I will state in a few words how I came to buy the machines, and what they have done. For some years I run an engine and shafting on my yard to which were attached two machines, one belonging to me, and of a make now among the most prominent in the market, and another, the Milwaukee, belonging to another man. This machine was made on similar principles to the Gurney Machine, having been gotten up by the same man. While I was being bothered a great deal with my machine, try-

ing to keep it in working order, the Milwaukee was going along day after day and year after year making good brick with very little trouble. This induced me to buy the two Gurney Machines, which are a great improvement on the Milwaukee, even; since which time I have made much better brick than before with a great deal less trouble. The brick always slip easily, while I find with other machines they have trouble with the brick sticking. The machines are never out of order, neither of us having spent five dollars for repairs or lost a half day's work on account of anything wrong with the machine. There is seldom a brick missing or a broken brick on the yard. These being the simple facts, I state them for the benefit of those who may be interested, and shall be glad if they are of use to any one. **HUGH HARRISON.**
Cleveland, O.

CLAY CONVEYOR.



This Conveyor or Carrier is especially designed to carry Clay. Mechanically it consists of two strands of our No. 52 Link-Belt all At Attachments, and to these Attachments narrow steel slats are riveted, overlapping one another, forming an endless steel apron. This apron, being metallic, is unaffected by moisture or any atmospheric changes; it can never slip, because the Link-Belts run over sprocket wheels at both head and foot. The wood-work for the erection is simple, and any carpenter can put it up in a short time. We will furnish drawings to assist our customers who use this device.

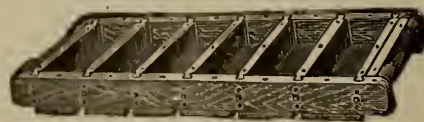
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THE CLAY-WORKER

VOL. V.

INDIANAPOLIS, IND., APRIL, 1886.

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Written for the Clay Worker.

PORCELAIN.

BY PROF. R. T. BROWN.

Porcelain is the name given to that fine form of pottery, which possesses the property of transmitting light, though not in such a degree as to form distinct images. Chemically considered, it is an illuminous glass, clay taking the place of the alkali in the common form of glass. While it is softened at a temperature sufficiently to vitrify it, yet it does not become fluid with any degree of heat. The invention of this form of pottery is ascribed to the Chinese, though at what date is not very well defined. Some Chinese writers claim that porcelain was manufactured in the "Celestial Empire" as early as 2,000 years B. C.; but the more reliable authorities do not carry the production of translucent ware to a period more than 200 years before Christ. It was made from clay found near Jauchan Fu, which has obtained the general name of Kaolin from the ridge or range of hills where it is found. Specimens of Chinese porcelain was brought to Europe by Marco Polo near the close of the 13th century, but the method of manufacture and the material of which it was made was unknown till the year 1712 when the secret was revealed by a French Jesuit who had spent a number of years as a missionary in China. From samples of the material thus obtained, Reaumur ascertained that the porcelain clay had very nearly the composition of decomposed granite, after the potash, soda, lime and iron had been removed by acids. Its composition per cent. is alumina 45, silica 40, water 15, all chemically combined. Besides these kaolin in its crude state, is mixed with a variable quantity of free silica in the form of fine sand. From this it is carefully freed by washing before being used in the manufacture of fine ware.

This discovery led to the establishment of a manufacture of porcelain at Sevres, from Kaolin artificially prepared from quartz and feldspar. In

burning it, however, a difficulty occurred in procuring saggars to support the ware in the furnace, that would endure a temperature sufficiently high to so vitrify the product as to give it the translucency of the Chinese ware. This difficulty was finally overcome by adding a small amount of bone ashes to the clay, which rendered it more fusible and thus produced the desired vitrification at a lower temperature; but the Sevres ware lacks the hardness and strength of the genuine Chinese porcelain. On this account it is generally known as "soft porcelain." This manufacture of French ware was established 1735, where, after 1769, they were supplied with true kaolin; and at the present time the French ware is scarcely inferior to that of true oriental manufacture.

Porcelain clays, resembling the Chinese kaolin are found in Saxony near Meissen; in Bavaria near Passau; in France at Limoges and at several other points on the continent. Kaolin of a fair quality is found also in England at several places, but is especially worked in Devonshire and in Cornwall from whence the great potteries of Staffordshire are supplied. In this country several deposits of kaolin have been opened and are now successfully worked. Haddam in Connecticut and Brunswick in Maine, furnish a good quality of porcelain clay, and these mines are quite extensively worked. From the display of fine clays at the Centennial exhibition at Philadelphia in 1876 we may safely say that the United States is abundantly supplied with the material adapted to the manufacture of the finest quality of porcelain. In all this variety we have seen no porcelain clay of a finer quality than the Lawrence county kaolin of Indiana. Its remarkable freedom from iron and lime, considering its location in the great subcarboniferous region, is a geological phenomenon, not easily accounted for. I have seen specimens of kaolin of an excellent quality from the Ozark mountains in Missouri, and beyond a doubt, the

Rocky Mountains, when properly explored will furnish, from the decomposition of its vast granite piles, clays of every variety.

The use of these fine clays for the manufacture of porcelain, is yet in its infancy in this country. The manufacture of fine table wares demands a vast amount of hand labor, both in the preparation of the material and in the moulding, painting and burning of the ware, as well as in the handling and packing of it for the market, after it is finished. With the present low price of transportation, we can hardly compete with the cheap labor of China, or even with that of Staffordshire, in this line of manufacture.

In making fine porcelain the clay is carefully picked and all iron stains or rough lumps are thrown out. It is then dried and ground to a fine powder and mixed with water in a tank where it stands for a few minutes, when the water is drawn off into another vessel, leaving the sand in the bottom of the tank. It is now suffered to stand till the clay is precipitated and the water becomes clear. This is carefully drawn off, leaving a doughy mass of clay. This is exposed to the air till it is so far dried that it can be kneaded. In this condition it is thoroughly worked, rolled and beat, till the mass is perfectly plastic. At this stage the Chinese workmen bury it in moist earth for a year, but this is considered unnecessary in Europe and America. It is now ready for the wheel, on which all regular shaped vessels are turned. Irregular forms are pressed in moulds made of plaster. Drying is a very important part of the process, and requires great care to prevent irregular shrinkage, by which vessels may be warped out of shape, or cracked.

The finest Chinese porcelain is said to be burned without any external glazing, but in this country, and in Europe, it is customary to burn the ware slightly, after which the 'biscuit' (as in this condition the ware is called) are dipped into the glaze which con-

sists of a little very fine kaolin mixed with a carbonate of potash or soda and suspended in water. After this dipping, when the ware is again dry, it is ornamented. The pigments used in this painting are metallic oxides mixed with some silicious matter which acts as a flux, so that the pictures are really made in colored glass on a white ground. The pieces are now placed in drum-shaped clay vessels, called saggers, made to endure a very high heat. These are set on each other in the kiln so as to relieve the ware of any pressure. The furnace is so arranged that the flame alone, passes through flues into the kiln. In this condition the heat is raised till the clay is vitrified and the glazing so completely incorporated with it as not to be distinguishable from it.

Porcelain manufacture is not confined to table ware. In China roofing tiles and the outside veneering for walls are frequently made of fine porcelain tiles, and in this country we make encaustic flooring tile out of porcelain clay, though we seldom heat them to vitrification so as to produce the true characteristics of porcelain. Door knobs and other articles of hardware are now frequently made of pottery, and are found to serve a better purpose than when made of metal, as they require no attention to keep them bright and in a presentable condition. Buttons, of an excellent quality and cheap, are made of porcelain material, and the manufacture may be extended to various other articles of household economy, with advantage. Porcelain is already used successfully in lining metal cooking vessels, and this hint could be much extended.

ALUMINUM.

Now comes the report that an Ohio man has discovered the secret of manufacturing aluminum at such a small cost, as to make the discovery a bonanza, worth many millions of dollars. We clip the following from the Toledo Blade:

"Aluminum is a metal existing in clay, granite and other rocky substances. In such quantities that metallurgists assert it comprises eight per cent of the entire earth's surface; yet, notwithstanding its abundance, it has heretofore been produced in such meager quantities that its value has until recently been nearly equal to silver. Man's ingenuity has been taxed to the utmost to discover a means of forcing nature to yield up her treasure but, lavish as she is with iron and gold and

silver, she doled out aluminum in minute quantities. The first knowledge of the metal was in 1828, when Wohler discovered it and waited eighteen years to examine it further. French scientists succeeded in extracting the metal from its clay, but only at a cost of over \$20 a pound. The Frenchmen required six months to complete the process. Subsequently an English chemist succeeded in reducing the time required to six days and the cost to \$10 a pound, at which price it still remains.

After twenty years of study and experiment a man, whose name the writer is not at liberty to divulge, has succeeded in finding a means of obtaining the metal aluminum by heat or a carbon process, hitherto supposed to be impossible, and at a cost so extremely low as not to militate against its general adoption for the commoner utensils used by man. Beside the great reduction in the cost, the time required has been reduced from six days to six hours, a most important matter. The gentleman who has put up the capital to further the plans of the inventor and who owns a half interest in it, called at the *BLADE* office to-day, exhibited bars of the metal produced by his process and explained in detail the plans he and his partner propose to follow. Their secret is covered over and over with patents that will give them a monopoly of it in this country and in Europe, and Ohio will have the distinction of being chosen as the location of the works. At Findlay, these gentlemen will, within a few days, erect works for the production of aluminum from clay, using natural gas for furnace fuel. The clay from which the metal is to be extracted is brought from West Virginia, but great beds of it exist in nearly all the states and territories. While it is true, as asserted, that all clay contains the metal, some is far richer in it and yields a better return to the operator. The cost of production where fuel is so cheap will be little, and it is possible that the rich clay may eventually be found nearer home, and a further reduction of the price of the metal will follow.

The uses of the metal are manifold, or rather without limit. In appearance it is a white bluish tinge resembling zinc. It is lighter than glass and one third the weight of steel. Its resistance breaking strength, is 40,000 pounds to the square inch and its tensile strength is 111,000 pounds to the square inch. As an alloy with steel and other metals it adds strength and reduces the

weight. A cannon cast of it would cost one-fourth as much as steel, be stronger and lighter. With a copper alloy it produces a rich yellow metal which resembles and stands the tests of gold, and as it amalgamates with all other metals its merits may be added to the manufactures of nearly everything made of metal. It is not effected by acids, does not oxidize from contact with the air, and is not effected by the gas known as sulphureted hydrogen which tarnishes all the silver of a household. Its great strength and lightness of weight adapt it for purposes where no other metal could be used. The air ship of the future will be constructed of it, the soldiers will all wear bullet proof armor made of it and the theoretical uses of it are countless. In practice the metal will be made into kitchen and table utensils, cutlery, carriage gear, car trimmings and in short for everything where now steel, iron, brass, silver and tin are used.

The gentleman states that he has been in communication with capitalists and others all over the world, all of whom desire to become identified with the great discovery. The manager of Rothchild's nickel mines in Europe made a fabulous offer and San Francisco parties desired him to locate there and make a stock company, for which \$10,000,000 would be subscribed. The gentleman has refused all offers and will go ahead in the construction of works at Findlay and manufacture the metal for market.

Written for the Clay-Worker.

THE CLAY-WORKER OF MONTROSE.

BY S. C. CRANE.

"Viola, if you have any regard for my feelings, you will be careful whom you are seen conversing with on the streets. This brickmaker is not a fit companion for a lady in your position."

"Leroy," said the young girl, "Mr. Leigh saved me from a dreadful death, where *you*——" and she left the sentence unfinished.

"It matters not and it is my wish that you should not recognize him in public."

"Mr. Grimm," she replied, her spirits now thoroughly aroused, "you are not yet my lord and master, and while I am free to act out my own honest impulses, I shall not fail to acknowledge the acquaintance of one who saved my life, and whose many noble qualities have made him honored and respected by all who know him. He is a laboring man and is proud of it.

But he needs no defense at my hands. Look at him, standing there, in every way superior in practical intelligence, and every manly quality, and blush for shame that you can thus insult him! When you have apologized to him, you may call and tell me so, and not 'till then!"

Harry Leigh stood calmly by while this was being said, and bowing low to Viola, he said:

"Miss De Vere, no apology is required, for none will be accepted. Good evening."

"Good evening, Mr. Leigh," and without a word to her betrothed, she walked homeward. He hesitated for a moment, as if inclined to follow her, but soon walked in another direction. He had reached "the beginning of the end."

CHAPTER IV.

Leroy Grimm found no time for reconciliation, however much he may have felt the necessity of appeasing his fair one's wrath at once. He returned home only to find his guardian under the doctor's care. A slight stroke of paralysis had prostrated him, and the patient required constant attention. At the end of the third day, he was sufficiently recovered to sit up, and as Leroy had been employing his time in writing that morning, Elnathan Lee requested him to write a business letter at the former's dictation. Having completed his task, the young man, took it with several of his own to the post office. Three days after, the old man received a letter, with the words, "sent me by mistake," written at the head of the first page. It is not the first time that arrant hypocrisy has overreached itself. Leroy Grimm had directed an envelope to the wrong address; and his guardian, as the reward of years of devotion to his victim's son, had nothing to console himself but the following letter:

"Dear Tom:

I have now some hope that our contemplated trip to Europe will not be long delayed. Old Hanks has had a paralytic stroke, and I wormed the opinion out of the doctor that he was liable to be carried off at any time by another. Something as I have often told you, is evidently working on his mind, and he cannot last long. I have been very devoted, sympathetic, and sat by his bedside through the long dull hours, and when I thought that the miserable old fellow stood between me and a splendid future, I swear to you that I was strongly tempted to smother the

little life left in him with his own bolster! This waiting for a dead man's shoes is always a tedious business, but I am young yet, and hope I will not be compelled to wait long; for, if I am, I shall become desperate.

I have had a little quarrel with my enamorata over the dirty brick maker, who burnt his fingers, as I told you, in getting her out of the fire at a Christmas ball. But her rich daddy is solid for me, and as she is his only child, between old Hanks and the pompous old aristocrat, I shall settle down with a cool half million. May the Lord land them both safely in heaven is my heartfelt prayer. A long spicy letter from you just now would be consoling.

Your old chum,

Leroy Grimm."

That the old man was able to write a few lines, let the following testify:

"Mr. Roderick De Vere:

As it is possible that the favor with which you have regarded the attentions paid by my ward, Leroy Grimm, to your daughter, may have been influenced by the expectation that he will be my heir, I beg, in the strictest confidence, to say to you that I have determined to direct my possessions in another and altogether unexpected channel. My principle reason for this will be found in the enclosed letter, written by my ward, and which has just accidentally fallen into my hands. As your name is mentioned in it, it may prove of interest to you, as it certainly did to me. Please return it to me privately, at your earliest convenience.

Yours, etc.,

Elnathan Lee.

Roderick De Vere received the above and the accompanying letter in the morning, and on the evening of that day, Leroy Grimm went forth intent on coaxing Viola into her usual pleasant mood. Instead of the fair girl, the father met him in the parlor.

"You need not sit down!" were the first words that reached him. "My daughter has told me of what occurred between you, but, aside from this, there are other reasons why your visits to my house should cease, and at once! It will not be advisable to speak to her or me when we meet. Our acquaintance ends here." "John!" to the servant, "show this young man the door. Hereafter, you will not admit him!"

It was only when Viola knew that she was free, that she learned where her affections had been leading her from the night of the fire, and yet she

knew not that Harry Leigh regarded her with other than a friendly interest.

While Leroy Grimm was on his way to and from the De Vere home, a lawyer with his witnesses had been closeted with Elnathan Lee, and they had left him, wondering at the odd conceit that should have induced him to make a will in favor of one whom he had never spoken to.

Whatever effect the returned letter may have had on Elnathan Lee's mind, nothing in his conduct betrayed any change of feeling toward Leroy Grimm, unless it was that he now spoke more freely of his condition.

"I feel that I am not long for this world, my boy," he would say, "and you shall soon have what you have been waiting for!"

"Do not speak in that way, my best friend," said the young man. "Have I not now all that my heart can desire? If you would make me happy, get well! I ask nothing more!"

Leroy Grimm was far from happy. Viola's beauty had captured his senses, and he cursed her father in the bitterness of his heart. But another and far more severe paralytic shock occurred that evening, and deprived his guardian of all power of utterance, or use of limb. "Never again," said his physician, "will he raise hand or voice in this world. It is only a question of days or weeks at the most, how long he may last." He lay there, and could only indicate his assent or denial by opening and closing his eyes, which retained all their intelligence and expression.

A strange communication had been made that day, privately, to Bryan Burns. And on the evening after the visitors called on Elnathan Lee. The housekeeper admitted them, and to Leroy Grimm's intense surprise and disgust, Bryan Burns and Harry Leigh entered the room.

"Mr. Lee," said Bryan, approaching the bedside, "there is something that I think now you would be pleased to know. I, usually known as Bryan Burns, am Bryan Reed, formerly of Leeds, England. You did me a terrible wrong once, but I am not here to upbraid you. God's hand rests heavily on you. You have, all unconsciously, done your duty. Look! Can you not see a strange resemblance between my young friend here, and your young wife, whom you left years since? Do you not see your own eyes, and your hair, before time had changed it, repeated in him? This is Harry Lee, your own flesh and blood. I was nev-

er to let you know it, but circumstances justify me in doing so."

It was a strange scene. The paralyzed arm could not be stretched forth in greeting, and Harry, who had only learned but an hour before that he had a father living, gazed sorrowfully on the stricken figure before him. But Leroy Grimm was stung to madness by their presence and what Bryan Reed had revealed, and he broke forth in his rage:

"See here, you fellows! It is too late in the day to come here with trumped up stories of newly discovered heirs. The old man has made a will, and could'n't make another if he wanted to. I hav'nt lived with the old fellow all these years for nothing!"

Elnathan Lee's eyes flashed indignantly at these insulting words, and when the doctor, who happened in at that moment, learned what had disturbed his patient, he ordered Leroy from the room, and the old man finally made them understand that he must not be admitted at any time. His sight and hearing were as acute as ever, and day after day and night after night, by turns, did Bryan Reed and Harry wait and watch at the old man's bedside. But some recreation is necessary, and Harry advised by Bryan, said one day to Messrs Grannis & Moldon:

"Gentlemen, I have one hundred acres of the finest clay lands in the country. I propose with your help, to put up works there, and utilize my possessions. In order to do this, I should be taken into partnership with you!"

"Why, Mr. Lee, you are worthy in every respect of our confidence, but a membership in the firm of Grannis & Moldon is worth a dozen times over an hundred acres of raw land!"

"But, gentlemen, in strict privacy, suppose I am the accepted suitor of a lady who has fifty thousand dollars in her own right, and is prospective heir to a quarter million more."

"You mean Miss ——."

"Pardon me, gentlemen, I was only supposing a case; I mention no names."

"Supposing such a case, friend Lee, we should be most happy to have you in our firm."

The next move on the chess board, Harry made that evening. He called on Mr. De Vere. After the usual compliments, he said:

"My errand is a brief one, but to me of the first importance. I love your daughter. I wish your consent to address her!"

"My young friend, I feel flattered

that a young man possessing so many estimable traits should do me and my daughter such honor, but you must admit that your position as superintendent is not such a one as my daughter's husband should occupy."

"But, suppose that Messrs Grannis & Moldon had to-day done me the honor of taking me into full partnership, and are to erect, under my management, additional works."

"My dear sir, give me your hand! You are an honor to the cause of labor! Messrs Grannis & Moldon are to be congratulated. Allow me to call my daughter! Viola, my dear," as she entered, blushing sweetly, "our dear friend, Mr. Lee, of the firm of Grannis, Moldon & Co., wishes to see you—on—business—yes, business, my dear! Please excuse me!"

They both did, gladly, and two hearts were happy. On that evening, Bryan Reed, said to Harry:

"Well, my dear boy, did you make one hand wash the other?"

"Yes," said Harry, smiling. "And they needed washing, sadly; there were an hundred acres of clay on them! But, seriously, how is my father?"

"Not so comfortable as he was. He misses you. I trust that his affliction has brought a blessing with it. He consented to see a minister this evening. I left them together."

Yes, the old man's end drew near, and the son did his whole duty by him. No hope could he indulge of being mentioned in a will made long ago. Either he or Bryan was in constant attendance until the end came. He died peacefully, and it is to be hoped repentant.

Two days after, his will was opened. Leroy Grimm was there, and was as much surprised as Harry was that the latter was invited to be present. The will startled all but the lawyer and Bryan Reed. After the usual preliminaries it continued:

"I give and bequeath all my possessions, of whatever nature, with the one exception named below, to a young man in the employ of Messrs Grannis and Moldon, known as Harry Leigh. I do this because I have quietly watched his career, and found him brave, honest and manly. His especial recommendation, however, is that he heartily despises my cowardly ward, Leroy Grimm, who will be none the happier for this disposal of my property.

To my ward, the said Leroy Grimm, I leave what he has long waited for,

my old shoes, with their contents, including a letter which he is perfectly welcome to make public. I ought to turn the hypocrite out on the world penniless, but have thought best to allow him enough to save him from actual want."

Leroy Grimm was mad with rage. "The infernal old scound——" he exclaimed, but ere he could finish the epithet, it was literally crowded down his throat by the strong hand of Harry.

"You are speaking of my father, you miserable whelp! Another word in my presence, and I'll throttle you!"

He *was* a coward, and in the impotence of his unmanly wrath, he stood and scowled the hate he dared not express in words. The shoes were found. They contained the letter that had brought about this change, and a certificate of deposit for ten thousand dollars.

Three months after, the men in the yards were again in holiday attire. A grand ball was given in the hall where three years before the beautiful Viola, was rescued from fierce flames by the young and handsome clay-worker of Montrose. To-night they were there, and as this ball is given in honor of Harry and Viola's nuptials, Roderick De Vere has claimed the privilege of inviting some distinguished ladies and gentlemen from a distance, and his countenance beams with supreme satisfaction as he introduces:

"My son-in-law, Mr. Harry Lee, of Grannis, Moldon & Lee. A credit to the cause of Labor, Sir, a great credit!"

But, aside from Harry Leigh, the proudest man there was the faithful and devoted friend, Bryan Reed.

THE END.

Strength of Brick Walls.

The question of strength of brick walls is often discussed, and differences of opinions expressed. The following is one of the rules given: For first class buildings, with good workmanship, the general average should not exceed a greater number of feet in height than three times the thickness of wall in inches, and the length not to exceed double the height, without lateral supports of wall's, buttresses, etc., as follows, for safety:—

THICKNESS.	SAFE HEIGHT.	LENGTH.
8½-inch walls	-- 25 feet	-- 50 feet
13 " "	-- 40 "	-- 80 "
17 " "	-- 55 "	-- 110 "
22 " "	-- 66 "	-- 130 "
26 " "	-- 78 "	-- 150 "

Where the lengths must exceed these proportions, as in depots, warehouses, etc., the thickness should be increased, or lateral braces instituted as frequently as practical.

Written for the Clay-Worker.

OPINIONS ON BRICK MANUFACTURE.

BY F. P. MEYENBERG.

Every manufacturer's goods are the best. The principles and methods adopted are also the best. The rivalry to increase trade with hopeful expectations of successful gain are prosecuted on all sides. While all think of having the best for themselves and the custom. It may be said, that they are all good, but somebody's production must be better than others. All opinions may be sincere, and the judgment in accord with their experience. But the experience may not be complete though sincere. Then sincerity is deserving of nothing beyond acknowledged honesty and nothing more. It is like the honest working man, faithfully at his post, but laboring under unreliable instructions.

There are differences of opinion in all kinds of business; even the brick makers with their well prepared mud have disputes with the dusty semi-dry-press men. All the virtues are oft-times argued on both sides, with the most loyal sentiments, of which the following is an average abstract: It is a common saying of the mud brick maker that "the true principle of making brick is to prepare the clay, mix it with water until it is plastic or of soft consistency, then mould, dry and burn and the brick will be a thorough one, and unexcelled by brick of any other method of manufacture." It is said that "brick made by the semi-dry process, will neither have constitution, density, cohesion of matter—in fact they will not stand the weather."

But when carefully examining into these subjects, the objection to the latter process is somewhat reversed. Since it is an easy task to make semi-dry-brick from 10 to 15 percent heavier than a slop brick of the same size, it must be acknowledged that the heavier brick contains the most clay, and the most solid material to corresponding dimensions; so there must certainly be a greater density of body.

In treating of the two processes, from 60 to 120 per cent. more water is used in a slop brick than is necessary to affect a combination of particles; and as long as the over amount of water is of no advantage, how can the semi-dry process be condemned for only adopting the exact quantity of moisture required for cohesion. The porous network of any brick is the agent that assists disintegration—its destruction. The capillary attraction of a brick having large pores is decidedly greater

than that of a brick having fine pores. While large pores will invariably fill with water, the force of suction of small pores is too interrupted to allow the ready escape of the air for the absorption of the moisture. As water expands about one-tenth its size under such condition to the freezing point, it does not require much explanation as to the difference in the effect upon a dense or a porous brick, or as to which is the most durable. But at the same time the hardness of the brick must be taken into consideration; as a partly and an entirely vitrified brick have a different absorption.

Water will penetrate the entire structure of a soft burnt porous brick, and then with the little resistance that it could offer to the expanding water when forming into ice, would have to burst in all directions.

In reviewing the constructions, constitution, stability and general qualities of moist or semi-dry process brick made by this process of suitable clay, (it may be remarked that the plastic clays are the most suitable for this process, on account of easy cohesion; and the best material to obtain lasting products by any other process—but the difficulty of manipulating them profitably, has set them aside in many cases), and comparing them with "mud brick" for standing the weather, and submarine work purposes in particular, the semi-dry process brick will prove the most excellent and valuable. (Of course, only thorough burnt brick are to be taken into account of any kind.)

The leading constituents of clays are silica, alumina, ferric oxide and alkalies in various combinations and proportions. All of these if separately fired will vary by hundreds of degrees of heat before reaching the melting or fusing point.

When these elements were imbedded or deposited by action of peculiar formation and composition and decomposition having done its work, leaving the alkalies uniformly in crystalline condition distributed with other substances. In considering a clay of the following composition: Silica 33.00, alumina 28.00, Ferric oxide 3.00, potash 3.00, soda .60, lime .20—supposing this to be a drift deposit with the silicate and oxide of iron in an imperfect state of disintegration, and observing the large amount of potash. The burning of clays properly, seems to change and arrest the state of decay it has entered upon by force of atmospheric oxidations. We are called upon to expel the acids and gases on one side, and absorb those required for its reforma-

tion and vitrification on the others. It will be necessary to effect with semi-vitrification, the silica which is a ready agent to combine with clay containing salts and join disintegration with quick renewal. Potash and soda are known to combine with the oxide of iron at a comparative low heat that will not effect the silica and alumina.

As long as shape and size must be recognized (even subjected to considerable weight during burning) the heat is governed by the standing up quality of the material in fire—and vitrification of the full body under such circumstances of former mixture of clay can only be imperfect, when the alkalies and metallic substances are proffered to go into amalgamation, which is the case if clay is exposed to dissolution in water, producing a flux that will soften the body of clay or brick to such an extent—preventing the vitrification of the refractory portions.

In the semi-dry process, the preparation of the raw materials is, not weakening the stability of clay by fluxible combination, as the iron and alkalies are held intact as being located during their original deposit and formation. Or in other words where no superfluous amount of water is applied, preventing the ready separation of all quickly soluble oxide and combination of alkalies. Then the *silica* and *alumina* are not exposed to the fluxy coating of each molecule, making the success of continuing heat to reach the semi-vitrified state of the silica possible.

Simply fused potash in combination alkalies and in proportion small amount of mineral, is not a strong weather standing substance. Now in examining a water or mud-made brick (of sandy clay as generally adopted) it will be invariably found that the numerous and uneven cavities—air cells are lined with this thin glaze described. It is this enemy that commands the burner to stop his firing before the substantial bulk of the brick has been sufficiently changed to make it a lasting article if he wants his brick to be a pleasing color and shape—tis the paving brick the common brick-maker sells at highest price—not the most serviceable one! and it is at the same time not the most out of shape and color! It is the most serviceable because its silica has been semi-vitrified—it is the most out of color because the fluxy combination became by manipulation the predominant body to be recognized—and if we go beyond its resistance to favor the stubborn substances to make them weather-proof—

then we have to annihilate the former fine stages of chemical production, giving the most pleasing colors.

Written for the Clay-Worker.

HINTS ON BRICKMAKING. No. 7.

BY R. BRICK.

Bricks are dried by contact with air currents which absorb the moisture from them. The drying power of air currents depend upon their temperature and velocity; dry hot air moving fast absorbs moisture rapidly. Bricks dry slowly even when the sun shines hot if there is no breeze, while they sometimes dry rapidly in cloudy weather when the wind blows briskly. The atmosphere in this respect is like a sponge; when the latter has absorbed a certain amount of water it will hold no more; when the atmosphere has absorbed a certain amount of moisture from brick with which it is in contact it will absorb no more and the brick will cease to dry. If, however, fresh air is continually replacing the moist, the brick continue to dry until they are as dry as the atmosphere; at this point they cease to dry. By the use of artificial heat, forced draft currents of dry hot air are brought in contact with the brick, drying them by carrying off moisture as it is absorbed. All drying is the same in principle and differs only in degree.

The advantage of sheds over outdoor drying, is, that loss by storms is avoided. There is no gain in time of drying, when they will not dry outside they will not inside. Drying with artificial heat, you not only save all the ware, but can dry brick when it is raining, and even when it is freezing, there is no loss of time on account of bad weather; with a dryer of this kind, one machine and one set of hands will turn out more brick per year than two machines and two sets of hands, outside; and in some seasons, one set with dryer will equal three, outside. The advantages of the dryer, is plain, it requires less power, machinery, tools and men. By giving men steady employment during the whole of the year a better class of labor can be secured. Again, in most markets, prices are better in spring than any other time of the year; if dried by "sunshine" they must be made during the early part of the preceding autumn and the stock carried over six months; with dryer, the entire season's product can be sold the same year, and by the first of

March or April, the spring stock is ready for market at a good price. Again, you can without risk, contract for future delivery, knowing you can fulfill your contract.

How is it where no dryer is used—unless the brick are made and on hand, the manufacturer has no assurance that he can fill his future orders. The cost of driers, some will say is an objection. There is no good thing without cost. Why can not a brickmaker put up permanent works as well as any other manufacturer?

When a brickmaker spends a thousand dollars for a good machine, kiln or dryer, one that is effective and durable, he has added just that much to the value of his plant. Another advantage where a dryer is used, is, that the brick are dried in one-fourth the space making much less distance to move bricks from machine to kiln, and no lumber to handle for covering bricks; again, there need be no night work, or Sunday work to save the bricks while drying.

The next thing to be considered, is cost of fuel for drying. In the flue dryer, slack coal is the best and cheapest. I have had many years experience with dryers, and will give estimate of cost: With coal slack at one dollar per ton, bricks cost to dry, twenty-five cents per thousand; in other words, one ton of slack will dry four thousand brick. Slack costs delivered, from fifty cents to one dollar and a half per ton, according to the distance from coal mine; the cost at the mine is from ten to twenty-five cents per ton. There are other dryers on the tunnel principle which I have no doubt will dry at less cost per thousand. Taking everything into consideration, it seems, even at a cost of one dollar per thousand it would be better and cheaper to use dryers, rather than the other uncertain risky method. Bricks dried by heat, require less heat to watersmoke than those dried by air. Make up your mind to investigate the different modes and you will find that artificial drying is best and cheapest. Adopt it, and at the end of the season, you will be, not only richer, but better and much happier. For what man can look upon the total wreck of 100,000 bricks with any degree of composure, and refrain from using fretful language.

To test the drying capacity of your clay, place a green brick just moulded on your boiler furnace or any other hot surface, where it will dry in from 12 to 18 hours, if it dries without breaking

it will dry in a dryer in that time. A brick to bear drying, should be free from lumps, in other words thoroughly tempered, so that the shrinkage of every part is equal. Bricks should be laid on a smooth, level floor to dry. Should the floor be uneven, so that a brick is suspended by its ends, or balanced on its middle, it will break as it dries. All these points must be watched, especially where the clay is tender and inclined to break in drying. There is a difference of opinion as to how much moisture a brick must contain when it is made. The less moisture it contains the cheaper it can be dried. I think it should have just what is necessary to make it temper and become plastic and adhesive. My opinion is that this can be done and have the brick stiff enough to hack from the machine. I made brick many years before I came to this conclusion, but it has been demonstrated beyond a doubt. It requires twice as much floor capacity to dry a soft mud brick as it does to dry a stiff brick. The former are dried on their flat sides while the latter are dried on their ends.

Correspondence.

Hudson River Brickmakers.

Editor Clay Worker:

Your readers may be interested in what the brickmakers in this section are doing. I find they are getting ready to start pumping out their clay banks and are fixing up their yards and machinery, shipping out their brick held over from last season and clearing out their kiln sheds for early work. I find that North, or Hudson River brickmakers do business and make brick different from the Western brick makers. Take it here at Haverstraw, the yards are leased or given out in clay rights; the landlord stipulates the amount of brick a yard must make and the lessee must pay for that amount of clay whether he makes the brick or not, and if he makes over that amount he has to pay for all the brick he makes. Some of the landlords furnish the power, that is, engine, pumps and shafting ready to run, and charge the brickmaker \$1.25 per thousand for clay and use of power. Where the landlord does not furnish the power then the brickmaker pays 75 cents per thousand.

The brick yards start to work at 4 o'clock and the machines stop moulding at about 10 o'clock, then the men put so many brick in the kiln and

hack up the ones made in the morning, and fill up the soak pits and then their day's work is done, which keeps them busy until about 6 or 6:30 in the afternoon. There are no pallet yards on the Hudson, the brick are dumped from the machine to the ground, the same as hand yards do in the West.

The Peck Bros. are changing their yard now to a pallet yard notwithstanding the brickmakers cry it down and say it won't work. The Messrs Peck are pulling against a strong tide. They are the first to adopt this improved method, but I venture the opinion that it will be but a short time till it will be adopted by a majority of the brickmakers on the river. Having seen a great many Pallet yards and as a representative of the Clay-Worker, I will assist them to make the change and give them all the information that I can. They have recently ordered four of Fletcher & Thomas' Pug Mills which they think will enable them to make more and better brick.

Messrs Peck deserves great credit for changing their method of making brick in the face of the opposition they are having; I am indebted to them for many favors. The next place we strike is Fishkill on the Hudson; there are lots of brick made here and also at Newberg, just across the river. Messrs McClain & Co. of Fishkill, is one of the largest brick firms on the river; they have their own boats and barges to take their brick to New York, which is the market for nearly all the brick made on the Hudson. McClain & Co. are also putting in Fletcher & Thomas' Pug Mill to temper their clay. This firm has been using the Buck Mold Sanding Machine and say they think it one of the finest machines they have ever put in and would as soon think of making brick by hand and throw out their machine as to do without the Sander. From Fishkill, we go up to Catskill and visit the yard of Ferrier & Golden, one of the oldest yards on the river, they make among the strongest brick made on the river or that goes in the New York market. We then come back to Roundout and visit Terry Bros. yard. About a month ago they had a landslide that sent half of their yard into the river; it was one of the worst slides that has occurred on the river for years. The slide covers at least 10 acres of land and took everything with it, burying all but one of their machines under ten to twenty feet of clay. The engine and boiler is under about fifteen feet of clay—the

office and safe can't be found. Messrs Terry are trying to clean up enough yard room to start the yard. They place their loss at \$50,000. This yard had a capacity of about 14,000,000 brick per year.

Many of the yards on the Hudson are using the Standard Brick Machine, manufactured by A. M. & W. H. Wiles, of Grassy Point, N. Y. Mr. Nelson Stephen, of Kingston, is putting up a New Quaker Brick Machine, Pug Mill, etc. HUSLER.

BRICK MAKING IN MASSACHUSETTS.

Editor Clay-Worker:

It is a well known fact that Massachusetts, is particularly a manufacturing state. It has the largest cotton mills, boot and shoe factories and other equally as large and important manufacturing, and all of them supplied with all of the improved and labor saving machines and machinery that the inventive mind of the particularly inventive Yankee could suggest. Follow-out this thought and this principle adopted by these named industries and the general progressiveness of these people, one would naturally expect to find this same advancement carried out in the manufacturing of brick, but it is not so. Massachusetts in that one particular is far behind any other locality in this country excepting perhaps some of the other New England states. It is not owing to the inferior quality of the clay, as it is superior to any that I have seen in any part of the country, and when made into brick, and properly burned is very hard and durable, but on account of the crudeness of the machinery used, the brick are rough and irregular. On most of the yards you find the old fashioned gum driven by horsepower, the molds are shoved out by hand lever, and the mud pressed in the same manner, making water or slop brick. Other yards a little more progressive, some of them manufacturing several millions of bricks each year, use steam power to grind the clay but hand power to shove out the molds, and to press the clay, making sand moulded brick. In the vicinity of Boston there are but eight complete steam power machines. Messrs. Parry Bros. & Co. of New Cambridge have five of those. They are particularly enterprising progressive men, and are alive to all new improvements. They have during the past year added to their plant one of Sharers' Improved Driers, A. Wingard Kiln, two of Fletcher and Thomas' Pug Mills and a Buck Mould Sander, all of which were furnished

them by E. A. King, 48 Congress St. Boston, and they are so well pleased with these improvements that they intend adding more this spring. Their drier was completed Nov. 10 1885 and since then they have made more than a million and a half of bricks drying them in this drier. They have made bricks regardless of the cold, and although the mercury was at times 12° to 18° below zero they manufactured without any difficulty.

Messrs. Parry Bros. & Co have practically solved the problem of profitably making bricks during the winter. A before unheard of thing in Massachusetts. These gentlemen deserve great credit for thus breaking away from the old methods and taking such a long step in the advance. Their additions, and improvements, have been closely watched by the other brick makers in their vicinity and variously commented upon, at first with derision, then with wonder that these machines would actually do as had been represented. And as the winter advanced and the cold strengthened, and the steam from their engines and the smoke from kiln and drier could always be seen the wonder changed to interest until some of the unbelievers are beginning to wake up and to realize that Messrs. P. B. & Co. were right after all. There is nothing that will wake a man up so thoroughly and completely, as to touch his pocket, and this method of brick making does decidedly touch the pocket of those not using it. As the fortunate possessor can make bricks every day regardless of the weather, and for that reason they can be made cheaper and put into the market at a less price than those that are made by the old method where so large a percentage is lost by rains and storms and besides the bricks made by the drier process are more saleable, as they are regular in size and uniform in shape. Now that Messrs. Parry Bros. & Co. have broken the ice and have proven the advantage in using this system other brick makers are becoming interested and it looks now as if at no very distant day, Massachusetts would bring the art of brick manufacturing up to the usual high standard of her other industries.

O. B. SERVER.

Boston, Mass.

Brick Interest at Toronto, Canada.

Editor Clay-Worker:

The manufacture of brick in Toronto has increased within the last few years from a few small yards, where five

hundred thousand bricks a year were considered a large success to its present growth and the output now equals fifty million bricks per year. More capital and improved machinery having been put in the business and brought it up to its present standing, and it is now one of the leading industries of this City.

The Martin Brick Machine is the one chiefly used, being well adapted for the working of the clay.

Bricks have been selling at eight dollars per thousand since New Years. There has been a large demand through the year and the supply was somewhat short of the demand but there are several new machines being erected in the different yards this season so we expect the output will fully equal the demand.

Our firm run seven Martin machines and we are putting one more in this spring, we run all by steam and make a daily output of about eighty five thousand bricks. We manufacture both red and white press and stock bricks but the demand for press brick is limited on account of the superior quality of the stock brick. In some of our yards we back the bricks up and in others we use the Rack and Pallet system. We like the latter system best and are adopting it where ever we re-construct or build new yards.

There are only a limited number of drain tile made here. The farmers in our vicinity do not go into the system of underdraining to any large extent. Some parties have started at different times to manufacture sewer pipe but as a rule they have only made a partial success of it as the clays are not adapted for this purpose.

We burn altogether with wood. Most of the brickmakers stick to the old style and burn in the old fashion open kilns, we have put in two kilns with furnaces to them, which we find are greatly in advance of the old fashion kilns as we are able to burn the bricks harder and also save greatly in the arch bricks as they do not crush and break to pieces as they do in the other kilns.

Wishing you the success the Clay Worker so well deserves, we are,

Yours,

Y. & C. Brick Mfr's

Toronto, Can.

Wants a Cable Road.

Editor Clay-Worker:

We wish to build a cable railway from our brick yard to the railroad

track, a distance of 1500 feet and would like to know if any such conveyor is being used by other brick makers and if they are, we would like to hear from them as to the best manner of constructing the road.

We have in mind an apparatus consisting of a number of cars or boxes hanging on a wire rope or cable, such as is used in mining districts for the transportation of coal, etc. It should be an endless chain so as to return or haul back the empty cars by the weight of the filled ones.

Our yard is 50 feet above the level of the railroad track.

Would like to correspond with any one who can build such a road for us.

O. BRICK & TERRA COTTA MFG. CO.
Omaha, Neb.

In our next issue we will give a description and sketch of a simple conveyor adapted to our correspondents needs.—[Ed.]

Architectural Terra Cotta from another Business Standpoint.

Editor Clay-Worker:

Your contributor, Mr. F. P. Meyenberg in his article on "Agricultural Terra Cotta from a business standpoint" published by you in your March issue needs some little correction in his figures as they are calculated very much to mislead those of your readers who have not had pocket experience in the manufacture of architectural terra cotta and whilst there is much possibly to be said of this business in its favor, still I would strongly advise (with my experience of 27 years) any party "looking upon the business with a fancy, fascinated by its pleasing character, with which it captivates the visitor at a Terra Cotta works" to consider well the pro's and con's before embarking into a business attendant with risk as to its perfect manufacture and necessitating a large capital for plant, which if it had to be sold would only realize about 25 or 35 per cent. of its original cost and not to embark into it at all unless he has either a good practical knowledge of the manufacture himself, or has a money-interested partner that has. Mr. Meyenberg asserts that the selling price of most of the architectural terra cotta is \$100 a ton with a profit based at 30 per cent. I deny this in toto. Such is not the case. If terra cotta manufacturers got \$80 per ton for their material they are doing well and the average may be safely struck at from \$60 to \$70 per ton and you will find

that this will be borne out by the leading terra cotta manufacturers of this country. I am well aware that such erroneous statements as these have been published before and the result has been that people have rushed headlong into the business knowing practically nothing of it having money to invest and have come out or rather run out of it wiser but poorer men. Of course they had their superintendent who was "going" to sell their ware at \$100 per ton and was "going" to make 30 per cent profit, but alas! the goal was never reached and so we find upon inquiring into the matter that a vast sum has been sunk and lost in this business in this country, possibly much of it from causes which might have been remedied and which may not exist in good working factories at present time. I consider the true value of an article published and brought before the public is in its correctness, and when the contributor has seen into an error, the sooner the same is put right the better, as there is no justification and no end worth gaining, in misleading persons about to embark into manufacturing operations. And again Mr. Meyenberg's article is misleading in that he says the balance between the selling price and the actual cost of the raw clay and coal is left for manipulation and profit. True but oh! how vague, for the actual manipulation or making of the pieces actually sold is not very large, but the amount of labor requisite in the various departments of the business to prepare for making the pieces to finish them when they are manipulated is very large. I see Mr. Meyenberg thinks it out of place to "detail the working and system as carried on." Well, perhaps it would be from his standpoint, but at the same time, as he is eminently able "fully and satisfactorily to prove why the manufacturing cost of Architectural Terra Cotta is so high, and how it could be made cheaper," I think he ought to give us poor manufacturers who evidently are groping somewhat in the dark, a little of the riches of his wisdom, as for one I will not be above suggestions from those who though not practically successful in a business may still be good and sound in theory. Mr. Meyenberg is correct in his denouncement of the way in which the majority of Terra Cotta manufacturers bid for work in competition, also in his views as to "Stock Work," but he is away off in his figures.

J. JOINER.

Brightwood, Ind.

Queries and Suggestions.*Editor Clay-Worker:*

Will some of your many readers kindly suggest a plan for removing water from a clay-pit which is too low to be tile drained. We can't keep the water out during wet weather and would like to know of some cheap method to get the water to the top of the ground where it can run away by an open ditch.

Would also like to know the best water and fire proof preparation to put on the top of the crown of the kiln. We used lime and sand last year but it cracked and scaled loose from the crown.

We are making tile only. Have the Eureka Tile Mill, (horse power) made by Chandler & Taylor, of Indianapolis, and think it is a good machine. We haul our clay by wagon from bank to mill, a distance of 6 or 8 rods—work the clay to a depth of about five feet.

We use the Wicker Bros' Round Up and Down Draft Kiln, and have pretty good success in burning except that they do not burn very hard around the wall in the bottom of the kiln and sometimes we have to leave some in the kiln to be burned a second time. The hearth is laid with common brick set on edge about $\frac{3}{4}$ inch apart and is laid even all over the kiln.

Would it burn the tile harder in the bottom around the wall and more even throughout the kiln by laying them further apart near the wall than in the center of the kiln?

Our sales have been a little dull but our tile are nearly all sold.

There is no ditching machine in this vicinity and farmers have to get their ditching done by hand. Think they would put down a great deal more tile if they could get their ditches dug by machinery and would therefore recommend this county as a good place for a ditcher.

G. W. S.

Spencerville, Ohio.

Brick and Tile Works at Bridgeport, Lawrence Co., Ills.

Editor Clay-Worker:

Main building 30x100, two stories high; mud shed 12x30, one story. We use the Hoosier Auger Machine, No. 2, run by 20 horse power engine, use exhaust steam for drying. We have about 2000 ft. of steam pipe under our lower hacks, use crushers, bring clay from bank with steam power in car with drop doors in bottom of car; deliver clay from car into the crusher. Our clay is very strong and burns a

bright red. We burn in the Eureka Kiln, Pat. by Brown Bros., of Washington, Ind. Burn with coal, wood, coke or slack; use which ever is cheapest. We burn wood when we can trade brick or tile for it. Our business is getting better; this is our second year. We sell the most 3 and 4 inch tile. Ours is the only factory in the county, the nearest factory being 12 miles distant. Prospects are good for this year. I take several clay journals and among them the Clay-Worker to which I give credit for our success. If I had not taken the journals, I don't think we ever would have made the clay working business a success. We have much to learn yet, but our work will compare favorably with old hands in the business. We make first class brick and tile both in color and ring. Wishing you success in your future work, Yours Respectfully,

COX & SCHMALHAUSEN.

Favors a National Convention of Clay-Workers.

Editor Clay-Worker:

I note with much pleasure, the reference in your last issue by Mr. Purington, looking to the organization of a national association of brick makers. I have long thought that such an organization would be of inestimable value to all parties interested. If I may be allowed to offer a suggestion, however, I would like to do so. It seems to me that the benefits to be derived from such an association would be greatly enhanced by including all advanced workers of clay. Why not make the association a "National Association of Clay Workers?"

There is everything to be learned by an inter change of ideas, both scientific and practical, in such a broad field. In many respects, we are all restricted in our knowledge of clays to those we are working and the particular branch of the art we represent. In my own case I have derived great benefit by extending my information into all branches of clay working, being personally interested not only in the production of front brick, but in the products of refractory material.

The question of combustion alone, as applicable to the burning of clays, is one of primary importance, and the experience of many years by those in all parts of the country, with various clays and various kilns, if discussed and published, would make an invaluable volume.

You can count on my heartiest efforts and earnest co-operation to aid

you in all efforts to enlarge our information and extend our knowledge in the broad field of clay working.

Very respectfully,
GEO. B. PARMELE.

Columbus, O.

Second the Motion.

Editor Clay-Worker:

Noticing in your March number the letter of D. V. Purington, Chicago, it strikes me that he has made an excellent suggestion in regard to steps being taken for a brick makers convention. Several states, the middle and western states particularly, have their tile associations, which meet in convention once a year, the different associations regulating their time so that any one meeting will not conflict with another.

These conventions touch on brick-making a little as nearly every tile maker is also a brickmaker in a small way, but a real genuine brickmakers convention has not been held in this country to my knowledge and there is no doubt whatever but such could be made of very great interest and will be attended largely from all quarters. My partner Mr. Robert Thomas is now in California where he is arranging some extensive brick yards for parties who have purchased complete outfits from us and I know he will second Mr. Purington's views heartily and Fletcher and Thomas can be counted on to encourage such a gathering at any time or place that may be deemed best.

S. K. FLETCHER.

Indianapolis, Ind.

Better Combustion needed.

Editor Clay-Worker:

Dear Sir—If there was ever anything said of Sound Sense and Truthfulness, it is the words: "There is so much said about it, but they tell us so little," in the communication signed "F. F." in your March number.

I am also equally satisfied, as your correspondent "F. F." states, that combustion and the art of applying heat to the ware in a kiln is less understood than any part of brick making at the present time. I consider myself under obligation towards "F. F." for bringing up this important subject, as probably many have not given it much thought. And should be pleased to hear some views from the able persons of the profession, also cordially extending my invitation to "F. F.", that will help to enlighten the

present crude ideas that are so persistently followed even by many intelligent brickmakers and clay workers generally who do know better. I myself will now promise to take up that subject in the near future to show how little progress there has been made in the science of burning, and what can be done, and what could have been done long ago.

Yours very respectfully,
F. P. M.

Chicago, Ill.

Get out of the "old ruts."

Editor Clay-Worker:

I am very much pleased with your able journal. I think it stands at the head of all periodicals devoted to the interests of clay working. I have read with interest the able discussions of the various topics pertaining to brick and tile making by Messrs. Thomas, Stookey, Dawson, Brick and others, and have gained much information from them. It has been truthfully said that as a rule brick makers are hard to move out of the "old ruts" but the time has come when we brick makers must get out of these "old ruts" and advance with other arts and science and I think the "Clay Worker" is doing a grand work in this direction. "Long may she live."

If I am not trespassing too much on your journal, I would like to ask some of the numerous readers of the "Clay Worker" where I can send a sample of clay to have it analyzed. We have a clay here which I think is a good fireclay, and I would like to have it tested. I will send a sample to any party who can analyze it or test it by burning. I do not know myself never having had any experience in that line.

J. S. VAN SCOY.

Woodbine, Ia.

Brick Works at Hastings, Minn.

Editor Clay-Worker:

My works were established in 1870. I use the P. L. Sword & Son, Brick Machine, and I like it well; it makes a good stock brick and does quick work. I also use the *Drake Press* Brick Machine, which I also recommend as a good machine. I use steam power and employ thirty hands, and turn out 1,500,000 brick yearly in the brickmaking season, (about five months work). My yard (at Hastings, Minn.) is twenty miles southeast of St. Paul, which affords me the best of shipping facilities both by water and rail. I have an abundant supply of clay, and it makes

a fine red brick. The brick in the arches are as good as any in the kiln, and I have always a ready sale for them.

I wish to say a few words in regard to your paper, "The Clay-Worker." I think it is one of the best and most valuable papers published, and I recommend it to all who are interested in clay working. It is full of valuable information. Yours Respectfully,
WM. SONDERMANN.

From Clark County, Ills.

Editor Clay-Worker:

I have been manufacturing brick three years. My yard is located near Casey, which has a population of 1,400 and it is a lively business place. A Mr. Brown has a tile factory who also finds a ready sale for all the tile he can make. Both the brick and tile business are new enterprises in this place. I made about a million brick last year. The sale of brick has been dull. Every man engaged in clay working should take the Clay-Worker.

JOEL WEAVER.

A FOOL FOR LUCK.

We often hear it said, "a fool for luck," meaning that some way or other, men without brains or purpose or plans, are the men who take the coveted prizes of life. But we don't believe that there is a word of truth in the saying, old as it is, and as oft repeated. A man may occasionally draw a prize without effort, but there is a thousand to one he don't.

The happy go lucky man, as a rule does not draw the prize. A man cannot run his business in a hap hazzard way without the risk of failing, aye, such are almost sure to fail. Think of a man running a ship upon the ocean without compass or star, and of the possibility of his ever reaching the desired port—not one in a thousand. So it is with business men. There is not one lucky fool in a thousand. Plan your work, systematize it, and work to your plans. Know what you are doing, don't depend on "think so's" but "know so's." Know why and how to do—know the cost of doing.

Avoid the happy go lucky way of doing business. It is better to have a bad plan of doing than no plan. It is better to fail with a plan than without one. There is hope for the man that fails with a plan, for he is so far disciplined that he will possibly find a plan that will ultimately succeed; but the man who fails without a plan is hope-

lessly at sea. If your plans are not working well, put them on the stocks for repairs, think them over carefully, amend where they need it, in every way attain as near as possible to perfection. By all means have a plan and work to it or make a better one, for there is no assurance of success in hap hazzard work. Never trust to luck but rather trust to a well matured purpose and business grit.—*Drainage and Farm Journal.*

NEW INVENTIONS.

The following is a list of patents appertaining to brick, tile, terra cotta, sewer pipe, pottery, etc., and the machinery used in their manufacture, issued since our last number:

- 337,575. Muffle for earthenware etc.—F. R. Gillinder, Philidelphia, Pa.
- 337,629. Tile-lined Structure—W. C. Sharpless, Philidelphia, Pa.
- 337,632. Potter's Wheel—B. T. Sheldon, Red Wing, Minn.
- 337,672. Burning Brick—J. De Hart, Kansas city, Mo.
- 337,696. Brick Kiln—R. B. Morrison, Oakdale, Ga.
- 337,829. Fire Proof Ceiling—C. C. Gilman, Eldora, Iowa.
- 337,927. Portable Brick Kiln Furnace—S. P. Crafts, Hamden, Conn.
- 338,018. Machine for making Brick Tile, etc.—C. J. Barstow, Cheneyville, La.
- 338,026. Artificial Stone—G. Blum, Orlando, Fla.
- 338,036. Brick or other Kiln—E. Chase Milwaukee, Wis.
- 338,121. Pug Mill—W. W. Wallace, Frankfort, Indiana.
- 338,206. Kiln for and Method of Burning Clay—S. Stubbs, Mt. Pleasant Iowa.
- 338,226. Mold-Bed for Crockery-ware—D. Hallum, East Liverpool, O.
- 338,465. Manufacture of Tiles—J. Bayer, and E. Puchta, Washington, Mo.
- 338,490. Brick Concrete Block etc.—H. C. Cowan, Oxford, O.
- 338,510. Fire-proof Floor—C. C. Gilman, Eldora, Iowa.
- 338,511. Pavement—C. C. Gilman, Eldora, Iowa.
- 338,512. Fire-proof Post and Column—C. C. Gilman, Eldora, Iowa.
- 338,513. Fire-proof Floor and Ceiling—C. C. Gilman, Eldora, Iowa.
- 338,514. Outer Wall of Buildings—C. C. Gilman, Eldora, Iowa.
- 338,515. Roof—C. C. Gilman, Eldora, Iowa.
- 338,516. Floor arch—C. C. Gilman, Eldora, Iowa.
- 338,517. Construction of Fire-proof Floors and Ceilings—C. C. Gilman, Eldora, Iowa.
- 338,518. Electrical Subway—C. C. Gilman, Eldora, Iowa.
- 338,678. Tile-Ditching Machine—H. Sullivant, Archie, Ill.
- 339,001. Kiln for Brick, Lime, Pottery, etc.—W. H. Melcher, Phila, Pa.
- 339,015. Paving-Block Machine—D. G. Ross, Hatton, Mich.

THE HOOSIER BRICK MACHINE.

The past five years marks a new era in brick making. The vast interest has developed into new life. A few years ago the general belief obtained that only hand-made brick were really merchantable, but now the largest brick works are operated with machinery. Each succeeding year, and we might truly say that each succeeding month, has witnessed the introduction of new and improved clay working machinery until a perfection has been attained far in advance of the most sanguine expectations. The imperfections have been marked and the subsequent inventions have improved upon those going before—the weak points have been made stronger until strength and simplicity of construction combined have in a large degree been attained.

For the past two years we have known that a new improved brick machine was in course of construction, undergoing careful tests. To-day we have the pleasure of introducing to the clay-working field this new candidate for public favor.

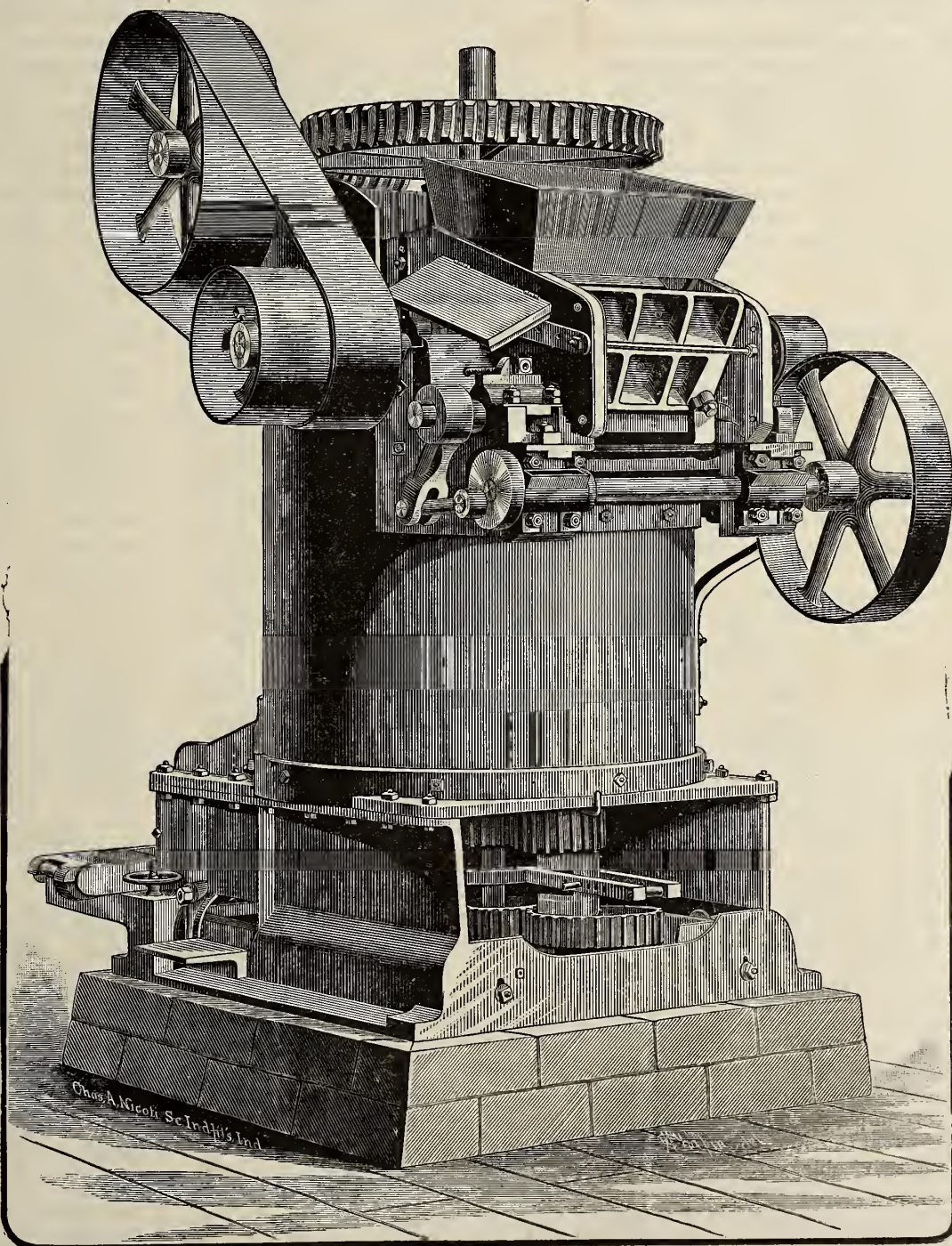
Messrs Nolan, Madden & Co., of Rushville, Ind., well and favorably known as extensive manufacturers of clay working machinery have had the work above indicated in hand and have succeeded in completing in a substantial manner a brick machine that they confidently believe will prove to be the leading soft mud machine.

The following brief description in connection with the illustration will serve to give our readers a pretty correct idea of its claim to superiority:

Heretofore in the construction of brick

machines the aim has been to provide protection against damage from stones that get into the machines. In the construction of this machine the manufacturers have provided to prevent stone from getting in, by combining with the machine a disintegrator which thoroughly disintegrates the clay grinding or throwing out all stone before the clay enters the brick machine. The use of this combination will dispense with the need of pugging machines, soak-pits and other machinery for preparing clay—the clay being worked if desired, directly from the bank. And

they further claim that no machine or process in use in brickmaking so thoroughly mixes the clay as this combination. Another striking feature of this machine is its simplicity—having less gearing, fewer pieces and less complication, than other machines in use. The main frame in which the plunger works, is in one piece; the main shaft extends through the machine having three bearings and the gearing attached between bearings, thus preventing the wearing out of line, or wobbling, common to machines having no bearing support below. The



mainshaft runs on a steel disk at the bottom. Every joint is planed and closely fitted to prevent leakage and to secure the strongest possible adjustment of the machine. On top, as will be seen by the accompanying illustration, is a device to prevent all dirt from getting into the journals.

The movement of the mold press is entirely a new device peculiar to this machine. The capacity is from 20 to 40 thousand brick per day depending upon the speed at which it is operated. With sufficient power and fair skill the larger number is not the utmost capacity of the machine.

The manufacturers determined from the first undertaking of its construction to combine the greatest strength, simplicity and speed possible, as well as the delivery of brick with perfect edges and corners, and to make them in every way a desirable product. From the tests already made, they feel assured that they are presenting to the trade a machine in every way worthy of public favor.

J. M. BLAIR'S SONS' BRICK WORKS AT NEW RICHMOND OHIO.

These works were established in 1875 by the late Jno. M. Blair who was for more than fifty years one of the largest contractors for brick work in Cincinnati. In that year his attention was called to the fine layer of clay on the Ohio river at the present site of Blairville.

He had been making brick on a large scale in "Mill Creek Bottoms" up to that time, but the clay there was of an inferior quality. After buying this desirable site, Mr. Blair traveled through various parts of the United States, and selected the best machinery for disintegrating, tempering and moulding this clay into brick in the most scientific manner, and in burning the brick when made by the most approved process. Starting at the claybank which is one of the finest in the world being 28 feet in depth, a fine red clay, uniform in color and entirely free from stone or other foreign substances which usually detract so much from the quality of the brick, the clay is loaded into cars built for that purpose by a steam shovel, manufactured by the Marlon (Ohio) Steam Shovel Company, which digs and loads these cars at the rate of one car containing two cubic yards per minute. Mr. Blair is the first to adopt this method of digging clay and is highly pleased with it. The cars when filled are drawn by steam to the tempering

shed on an incline track running from the bank to the shed. When the car reaches this shed one side of the car is so arranged as to fly open, and the clay falls into the crushers which grinds it into fine particles.

It next passes up an elevator or endless steel belt into the pug mill where it is watered and thoroughly mixed until the slightest lump is eliminated and the clay is of the consistency of dough when it is in proper condition to mold into brick. Mr. Blair considers the thorough pugging or tempering of the clay the most important part of brick making.

From the pug mill the clay drops into the brick machine, where it is pressed into the molds with a plunge of great force and a compact solid brick, (not made with hands,) is the result. Fast as they leave the machine the brick are placed on iron pallets, each containing five brick, five of these are placed on a truck and conveyed by boys to the drying floor upon which the pallets of brick are laid. This drying apartment is an enclosed brick building covering a smooth paved floor of one hundred and twenty by one hundred and twenty feet, under which floor is a honey-comb of flues one hundred and forty-four in number, which are fed by twenty-four furnaces placed in front of them. The heat generated in these furnaces passes through these flues, and heats the paved floor, and the bricks are artificially dried, enabling the Messrs. Blair to make brick continuously winter and summer regardless of the weather and make a much better brick than by the old hand sunshine method. After the brick have lain on this floor until sufficiently dry, they are then loaded upon small trucks, and drawn by a mule into the kilns where they are set ready for burning when the kiln is filled. They have six of these large kilns holding a total of two million five hundred thousand brick. They claim to burn their brick by the best, the "Wingard" patent process.

The kilns are of permanent substantial structure thirty by one hundred feet and twelve feet high, with walls two feet thick.

On account of the toughness of this clay and solidity of this brick it takes from twelve to fourteen days to burn a kiln, while only from five to six days are required to burn a kiln of brick from the ordinary light loamy clay. They use in burning, only coal and coke consuming last year one hundred

and fifty thousand bushels of coal and one hundred thousand bushels of coke in the prosecution of their business.

When the brick are ready for shipment they are loaded on cars holding about one thousand each and which run on a track passing the ends of the kilns with a turntable in front of each kiln where a temporary track as is needed runs into the kiln. One end of the main track leads to a side track of the Cincinnati and Eastern, the other down an incline to the river. They have two boats of their own. The "Boat" and "Alice" each boat will carry 140,000 brick, and are towed to Cincinnati.

The Messrs. Blair employ about one hundred men, and run at present two machines, with capacity to turn out fifty thousand brick a day, and have just contracted for a third machine, which will make them able to furnish 75,000 brick per day.

Their brick are in demand as fast as they can make them on account of their superiority.

In the construction of the Cincinnati music hall, exposition buildings, the new custom house, post office, East End gas works, and the new court house these brick were used. They also make a superior quality of face brick.

The firm consists of B. W. Blair, of New Richmond, O., who has charge of the works, J. M. Blair and J. T. Blair who reside in Cincinnati, and attend to the selling and financial part of the business.

B. W. Blair, the genial manager formerly resided at Cincinnati where for five years he was engaged in the practice of Law. He is a clever gentleman and very popular in business and social circles.

There are quite a number of houses built by the firm at Blairville for their employes making a neat little village.

HELPS DO MORE WORK.

Machinery is not labor saving. The man who works with a threshing machine, works as hard as his grandfather did with a flail but he produces greater results. To those who think only of the price of wages, machinery is a fraud, but to the consumer of manufactured articles it is a boon. Our mothers used to card their own wool, spin and weave it and wear it, and it is no disparagement to our wives and women could and would do all that and more too. Machinery has not obviated the necessity of work, it has only given it a new direction. Good machinery is a good thing, but the man who expects it to do his work will be fooled, it helps him to do more work.

THE CLAY WORKER

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ADVERTISING RATES FURNISHED ON APPLICATION.

Correspondence on all subjects of interest to Clay Workers is solicited. Communications from practical men will always be welcome. Address all communications to

T. A. RANDALL & CO.,

25 Thorpe Block, Indianapolis.

THE MILL STONE MUST GO.

"I wish I could get some good old fashioned flour, this 'new process' gets dry so quick, besides it is not as good as the old kind, anyway," said the housekeeper as she sat down at her table with bread not twenty-four hours old, yet too dry to be good. Can't help it, Sister! There are a thousand reasons, so to speak, why the miller prefers to use patent machinery, and the old mill stone must go! Lots of millers stubbornly held on to the old process, for years, intending to starve out the rollers, but after wasting thousands in attempting to compete with the mills that used them, they had to take out the old and put in the new.

Carefully examine all improved machinery. You will find all that is truly valuable, advertised in the papers devoted to its class. While we would not advise you to take every thing that comes along, we would be very sorry to encourage that old foggyism that would hold on to the brick making or pottery work of a thousand years ago. No columns of any paper are so valuable to the professional man as those that acquaint him with the tools of his profession.

THE LABOR QUESTION.

Our nation at this time is passing a crucial test upon the labor question. Labor is crying out that capital is oppressive—grinding the lives out of employees. Capital replies we can't make anything on our investments and pay more—the markets and competition forbids it.

There are errors on both sides that need to be combated.

It is an error to import cheap labor from Europe, they soon grow away from their employers. We like the

stamina and enterprise of much of the foreign immigration, but a part of it we would be much better without.

It is an error not to pay fairly remunerative prices for labor, if the trade justifies it.

It is an error to hold laboring men as so many slaves.

Those having in charge the management of a large business of any kind where it is necessary to employ the labor of others ought, as far as it is possible, to seek to better their condition—by paying liberal wages—giving them regular employment, and paying men in proportion to their skill and efficiency.

It is an error, and a serious one for labor to demand uniformity of wages—for it only means to reduce good workmen to the level of poor ones—that's all—then the good, will relax their efforts and all go down together.

It is an error to demand the reduction of working hours to one scale in all lines of business. It is necessary in some instances no doubt, but in many lines of business it is not possible to set the bounds of working hours.

It is an error to arbitrarily demand an advance of wages. Those that contract labor in certain lines of business have to be governed by the wages paid in this and in other countries in the manufacture of goods which come in competition in the markets of the world.

It is an error to prevent others from laboring to support themselves and families.

It is an error to undertake to manage other people's business, and determine for them who they shall hire, how much they shall pay, and how long they shall work, etc.

It is not an error to strive to better our own condition by seeking to get a larger remuneration for labor or to become so skillful that our labor will command the highest market price.

But business enterprise must and will manage its own affairs, or capital will, so far as it can, withdraw from business—at least in further investments, in a thousand ways, until it is definitely settled that those making investments will be allowed to manage their own affairs, in a legitimate way.

The present labor troubles will (we predict) deprive thousands of laboring men from getting steady employment this year—and longer possibly—but what do some of the strikers care while others feed them, while they strike.

We are confident that no amount of striking will ever settle this question;

it will only make matters worse by increasing the number of unemployed laborers. That there are many instances where labor deserves much more, and of right cries out, we do not deny, but the only remedy that will not do more harm than good is to settle the difference by arbitration and where that cannot be done, seek elsewhere to better the conditions. We favor organized labor that seeks to uplift its membership, but not an organization which seeks to reduce all to a common level.

ILLUSTRATING MACHINERY.

The importance of using illustrations that will convey a correct idea to the mind of the construction of the machine or machinery is often overlooked.

Some have thought that anything that in part represents the construction is sufficient, that parties interested will write making inquiry and then there will be an opportunity to present the facts. But this is an unwise conclusion, for the reason that our first impressions of mind about anything are difficult to change. A new machine is advertised—we are interested in such machinery, and examine it as far as we can from the illustration, and largely make up our mind as to its merits or demerits.

If our impressions are unfavorable, we most likely never look after it further, unless something comes in our way to attract our further attention. Our unfavorable impression may be in part the result of the poor illustration; it may be rough, crude, dim, or blotched, so as to be repulsive to us, otherwise if the cut illustrating it had been well executed, we would have formed a very different impression; and possibly we might have become a purchaser of the machine. Those having any line of goods to sell, will do well to spare no expense in having the very best work done in the engraving of their illustrations.

A wood cut engraving (well done) is best—showing a finished machine, ready for the market. These wood cuts should be engraved from photographs of the machine. Photos may be rephotographed upon the wood direct the size desired and the engraving done from the latter. There is a wide difference in the skill of engravers—one is able to bring out every line and shade so distinctly that any one examining the illustration can almost see it in operation; another makes an indistinct illustration—one that might in some way serve to remind us of the machine if we had before seen it. The latter

cut probably costs less money but it makes fewer sales.

A wood cut should not be used to print with, if it is intended to preserve it for future use, but electrotypes should be taken from the wood engraving and the wood cut preserved for other electrotypes to be taken from if they are needed—using the electrotypes to print from only.

We have been thus particular for the reason that many persons are not familiar with the methods of obtaining cuts to illustrate with. We very frequently have inquiries to answer, and not infrequently the charges for engraving the wood cut are thought to be high and the electrotype very cheap, whereas all the labor is expended upon the engraving. A rough sketch engraving can be done for half the cost of a fine engraving. The latter however is the cheapest in the end.

REDUCING THE COST OF PRODUCTION.

"The survival of the fittest" is oft quoted without considering how much is involved in it.

It means among the lower order of animals the surrender of life, and kind in some instances—in the highest order (man) it may mean the loss of life, or it may mean a kind of slavery, on one hand and mastery on the other. In business "the survival of the fittest" means success on one side and failure on the other—the result of competition, the measuring of strength, the weaker having to succumb.

Strength in business, what is it? Money labor—yes, in part—but more in the economy of its management. A business may be small, but so well managed as to be strong, or it may be large but weak. Money is necessary—labor is necessary, but economy is absolutely necessary to success. In the clay working interests, there will be sharp competition—in some instances there is already, but "the survival of the fittest" will be with those who economize and manage their business best. The present is an important crisis, every one should seek to make the best goods at the least cost. It behooves each to save at every point in the selection of the best clay, get it to the mill or table, press or mold, dry and burn at the least possible cost. There is much to be learned all along the line. In the matter of burning, special attention needs to be directed to this point; there is none more important in the production of the clay product.

We copy from the *Draught Journal*

an interesting account of a recent visit to the Deaf and Dumb Institute, near Flint, Mich., in which the writer presents the importance of the matter of better combustion and the utilization of heat:

"The system in use is known as the "Murphy Patent," which, in part, consists of side grates inclining to the centre. The chambers to receive the coal are placed at each side and may be kept full without exposing the burning fuel to overdrafts of air. An automatic feed keeps the burning fuel on the grates sliding slowly to the centre where the ash is discharged into the ash pit below. The supply of air necessary to a perfect combustion is admitted through heated chambers. In the heating of so large a building there is necessarily, several tons of coal consumed daily. One man is kept almost constantly employed in shoveling the coal into the several chambers, but at no time can any smoke be seen coming from the chimney stack, which is burning the fuel without making smoke.

To show us the difference between the common system of burning fuel and the Murphy, the superintendent requested the fireman to open the direct draft door and throw in two shovels of coal, which he did, and immediately the black smoke issued from the stack. The saving by this method, compared with the common grate furnace and direct draft, before in use at this institution, is found to be 40 per cent. of the fuel, with better heat.

Gen'l Humphrey in a very interesting paper on combustion, makes the statement that from carefully conducted experiments the past season, he finds that 57 per cent. of the heat generated in the furnace and passed through the ware of the common down draft kiln is lost.

Verily we have much to learn yet in the more perfect combustion of fuel and the utilization of the heat after it is generated.

In these days of sharp competition in sales, and labor strikes, it behooves those who are consuming cords of wood or tons of coal daily, to study this subject very closely. The saving of 40 per cent. in the use of furnaces so arranged as to give this result, is a saving in the cost of producing tile or brick, worth looking after sharply. The burning of fuel with open doors or having furnace mouths that might as well be open taking in great currents of cold air, is a waste of fuel that should not be. Let no one say "this fuss about

waste of fuel and heat is all bosh," for indeed it is too true, that this waste has bankrupted those who would have otherwise been successful.

Furnaces can be built with doors that will close tightly in front and with opening to admit the air through heated chambers at the points on the side where the combustion of the gas will be complete and the greater amount of heat generated.

Then comes the utilization of the heat after it is produced, why should 60 or 70 per cent. of it pass off into space without doing any good.

These questions have to be considered with care, and those who succeed in constructing furnaces and kilns that compass largely the saving of this loss will have a key to success in the brick and tile business."

EDITORIAL NOTES and CLIPPINGS.

Cincinnati brickmakers anticipate a large trade.

Blackmer & Post, the well known Sewer Pipe manufacturers of St. Louis are crowded with orders.

The Walnut Hills Brick and Terra Cotta Co., of Cincinnati, has been incorporated. Capital Stock \$18,000.

The Birmingham Fire Brick Company will add new machinery to their works, to manufacture coke oven bricks.

The Diamond Fire Clay Co., of Urichsville, Ohio, has recently been incorporated with capital stock of \$25,000.00.

A hotel to cost \$4,000,000, the largest in the South, is about to be erected in Jacksonville, Fla. The walls will be of ground coquina, mixed with cement.

The county commissioners, Northampton, Mass., have decided to build a new court house this year. It will be brick, four stories high, and will be heated by steam. Estimated cost, \$85,000. For particulars, address Col. E. A. Edwards, chairman, Southampton.

The Chicago Anderson Pressed Brick Company have offered a premium of fifty dollars to the Chicago Architectural Sketch Club for designs for brick mantels. This amount will be divided into three prizes of \$25, \$15, and \$10, for the three best designs for a hall mantel, eleven foot ceiling, made from brick in the firm's catalogue, with no terra cotta, the designs to be adjudicated by three prominent architects, the money to go to the successful draftsman and the design to become the property of the company.

INDIANAPOLIS TERRA COTTA CO.

The Terra Cotta Works at Brightwood, Ind., a suburb, northeast of Indianapolis, recently operated by the Indianapolis Terra Cotta Company, were purchased by Messrs Mason, Stilz & Joiner, a few weeks since, who intend carrying on the manufacture of Architectural & Horticultural Terra Cotta in all its branches. We understand that the present proprietors will continue under the name of the Indianapolis Terra Cotta Company, two of them having been connected with the late company from the commencement. The works have been thoroughly renovated and everything put into good working order preparatory to starting up, which they will do about the middle of April and it is anticipated that the whole capacity of the works will be in active operation by the middle of May, as they have already a few orders on hand and many others in negotiation, there being a steady increasing demand for this constructive and beautiful building material. The late company achieved a reputation for the excellence of their manufactures, having supplied work for many large buildings, some of which we might mention as—at St. Louis, the Exposition Music Hall; the Water Tower and Paper Houses at St. Paul; the Chamber of Commerce Building and the Thompson Building, at Davenport, Iowa; the Soldiers' Home, at Cincinnati; the Grand Central Passenger Station, at Columbus, O.; the Wesley M. E. Church Chapel, at Chicago; the Gaff Building, at Princeton, Ind.; the Court House, at Pittsburg; the Singer and the Standard Oil Co's Buildings and the Hospitals for Insane, at Richmond and Logansport this State consisting of 27 buildings, and it is the intention of the present proprietors not only to continue the high class of ware turned out by their predecessors, but alternately to improve upon it. An extensive addition to their illustrated catalogue is in the hands of the Lithographer, which will be mailed free of cost upon application to the company at their works, at Brightwood, where they have on hand a full line of first class stock ready for shipment. We wish the present proprietors every success in their undertaking.

MENTION THE CLAY-WORKER.

When writing to advertisers, please say that you saw their advertisement in the Clay-Worker.

NEW PUBLICATIONS.**SOUTHERN TERRA COTTA WORKS.**

We are in receipt of a catalogue from the above works. We are especially interested in the receipt of it for two reasons. (1.) It represents the establishment of the first works of the kind in the southern states, and we are particularly pleased to see the various manufacturing interests fully represented in those states. (2.) Last August we made a flying visit to the enterprising city of Atlanta, where we made the acquaintance of Messrs Pellegrini & Castleberry, the proprietors, and examined their clay and their goods and found them to be of a high order. Many of the designs were beautiful and the skill not excelled by any. The catalogue shows that further progress has been made, and that they have now a large line of very handsome designs. Success gentlemen!

A WIND MILL.

Solomon says, "of the making of many books, there is no end," but who would have thought even in his day of writing a book about wind mills, but here it is, a book on wind mills, and quite a large book too, by Alfred R. Wolfe, published by John Wiley & Sons, 15 Astor Place, New York. Price \$3.00. And it tells all about the construction and how to manage them. In the clay working field, many of these wind engines might be utilized in pumping water into reservoirs and for other purposes, saving much labor which is money. We have again and again advised their use and have found a few in use doing excellent service.

THE ART AMATEUR

For April gives a striking design of Easter lilies for embroidery, another of blackberries for wood carving, one of birds for oil painting, a cup and saucer decoration (forget-me-nots) and five pages of monograms, figure sketches, old ecclesiastical embroidery and simple designs for repousse work. The special feature of the number is an exceedingly full and interesting account of the Morgan art sale, with a complete list of the pictures sold, the buyers, the prices they paid and the prices Mrs. Morgan gave, together with the names of the dealers who sold the pictures to her. The Paris Water Color Exhibition is reviewed with attractive illustrations, and flower painting in oils and amateur photography receive special attention. Suggestions in great variety are given for Oriental rooms, and there are notable illustrations of an old Turkish fireplace, a salon in Turkish

style and various decorative furnishings of an Oriental art. Price, 35 cents. Montague Marks, Publisher, New York.

LANSING WHEELBARROW CO.

Sends us a neat little catalogue and price list of their goods including almost everything in the line of wheelbarrows, trucks, etc., for brick and tile yards. Our readers wishing anything in this line should send for a copy. See their "ad" on another page.

IT PAYS TO ADVERTISE IN THE CLAY-WORKER.

As witness the following copy of a letter recently received.

Headquarters of the

Kennedy Dry Press Brick Machine.

W. M. PETTEWAY, *Gen'l Ag't. & Man'r.*

204 North Third St., St. Louis, Mo.

T. A. Randall & Co.,

Pub. Clay-Worker,

Gentlemen:

Enclosed find my check in full payment for 3 months advertisement in the Clay-Worker. This investment I consider one of the best I have ever made. Wishing the Clay-Worker continued success, I remain

Very Truly,

W. M. PETTEWAY.

The March 6th issue of "BUILDING" contains the second paper on "Slow-Burning Construction," by W. H. Dabney, Jr., Architect to the Mutual Factory Fire Insurance Companies, of Boston; the continuation of Mr. Warren R. Briggs' excellent series of articles on "The Planning and Construction of School Houses," with plans and perceptions of a model suburban school. Mr. Wm. B. Tuthill, Architect, continues the discussion, in his articles on the "City Residence, its Design and Construction," of various plans for apartment houses, including what is known as the Duplex System. Various plans of apartment houses are given in the text. Mr. J. Piekerling Putnam, well known through his "Lectures on the Principles of House Drainage," speaks of the necessity of thorough ventilation for soil pipes and waste pipes, and of the evils and objections to special trap ventilation, in his article on "Improved Plumbing Appliances." There is also an illustrated article on the Street Memorial in the royal Courts of Justice, London, a Book Review Department, the Weekly Report on the Real Estate Market, a trade supplement reviewing the industrial progress and a four-page supplement of the "Building News" of the week, besides editorial comments on the topics of the day. In the Illustrations, sketches are given for small laborer's cottages, for a country church, details a staircase hall for a city house, finished in oak, and the perspective view and plans of the new Clubhouse for the Elmira Athletic Association.

NEWS AND TRADE NOTES.

The Chattahoochee Brick Co., Atlanta, are now turning out 200,000 pressed brick per day.

The New York Tile Company, of New York and Zanesville, Ohio, has been incorporated to manufacture tiles.

The Pennsylvania Steel Co. have ordered another 50 H. P. Westinghouse engine, being the sixth within three years.

J. A. Buck, Crescent, N. Y., informs us that the demand for his Brick Mould Sanding Machine is steadily increasing.

The Kansas City Sewer Pipe Co., recently booked an order for 70,000 fire brick for the Calorific Brick Co., of that city.

The Wallace Manufacturing Co., Frankfort, Ind., report their trade better than ever before at this time of year.

A 150 H. P. Westinghouse automatic engine has been set up in the new mill of the Oliver Oil Co., at Columbus, S. C.

The Peerless Brick Company, of Philadelphia, have issued a circular, illustrating a number of new styles of ornamental pressed brick manufactured by them.

We call special attention to the Climax Fence Post, invented by Jno. E. Donaldson, of Montezuma, Ind., cut of which appears on page 145, of this number.

The Hamilton Machine Co., of St. Louis, have recently ordered another car load of the Anderson Chief Brick Machines to be put up at different points in Missouri and Kansas.

Fate & Freese, Plymouth, Ohio, the well known manufacturers of the Ohio Tile Machine have placed upon the market their new Steam Engine which is proving a decided success. Write them for descriptive circulars.

Myers Bros., of Warren, O., recently purchased a "Chief" brick machine, write that they have commenced operating it and find it to be just what they have wanted. They are perfectly delighted with it and the work it turns out.

E. A. King, 48 Congress St., Boston, Mass., Special Agent for Fletcher & Thomas, in the New England States, reports sales in his territory during the past month as follows: Ten Fletcher & Thomas' Pug Mills, one Potts Disintegrator and Elevator, and one Buck Mold Sanding Machine. He says the outlook for trade in this line in New England is very flattering.

A. La Tourette, Marion, O., reports trade good. His rapidly increasing trade in Drain Tile and Brick Machinery, necessitates the enlargement of his works. He has recently put in two new iron lathe planers, a vertical drill, chucks and a general stock of tools.

The Newspapers seem to take kindly to the Westinghouse Engine, as witness: The Dallas "News," Minneapolis "Tribune" (two engines), Boston

"Globe" (two engines), New York "Daily News," Cincinnati "Commercial Gazette," etc., recent purchasers.

Max A. Th. Boehneke, of Omaha, Neb., writes that the Omaha Brick & Terra Cotta Mfg. Co., are so well pleased after having used one of his Continuous Kilns, cut of which may be seen on another page, for seven months will at once build another with a yearly capacity of eight million brick.

C. J. Swanson has been awarded a contract for furnishing the city of Minneapolis with 1,000,000 brick at \$9.75 per M. and the Wisconsin Red Pressed Brick Co. has been awarded a contract to furnish the city with 800,000 brick at \$10.75 per 1,000. The brick are to be used in sewer construction.

The Capital Press Brick Co., of Washington D. C., have contracted for five of the Improved Andrus Brick Presses (see cut of machine on another page) which will give them capacity for one hundred thousand bricks daily.

The Roller Chain Belting Co., of Columbus, O., write us that business continues good with them. They are running their works full time and have orders for chain elevators and drive belts to keep them busy for some time yet. The demand for their machinery is steadily increasing.

A. O. Jones & Co., of Columbus, O., are making pavement tile, 8x8x1½", with the "Chief" Brick Machine, from a special die devised for that purpose. They purchased the "Chief" this spring and have been making fine brick with it from the time of first starting and find it works to their entire satisfaction.

The Anderson Foundry and Machine Works have recently sold their "Chief" Brick Machine to Myers Bros., Warren, Ohio; Deolin & Christopher, Spring Valley, Ills.; C. P. Henderson, Grand Island, Neb., and numerous others. They are also selling their "New Departure" tile machine faster than they can be manufactured, having placed on file several orders this past month.

Mr. R. B. Morrison of Oakdale, Georgia, a practical and successful brickmaker of many years experience, has invented a brick and tile kiln, which he believes to be superior to any now in use. Several of the kilns were built last year and are now in operation. Those using them commend them very highly. A cut and description of the kiln will appear in the next issue of the Clay Worker if engravings can be made in time.

Messrs. C. & A. Potts say their trade continues satisfactory. Among recent shipments they mention the following: One disintegrator to Memphis, Tenn., one to Austin, Texas, and one to Jacksonville, Fla., all to work in connection with Eureka Dry Press Brick machines; also two to their New England agent, Mr. E. A. King, and one to Hamilton, Ontario.

Messrs. Millen & Sons of South Bend Ind., put in a disintegrator about the first of March and are so well pleased

with it that they have ordered a second one.

Fletcher & Thomas, Indianapolis, Ind., report additional sales of Brick Machinery and brick yard supplies since our last issue as follows: Two complete steam outfits in Sacramento, Cal., including the Improved Quaker Machines, Spiral Pug Mills, Mold Sanding Machines, Brick Molds, etc., One Machine in Canon City, Col., One in Nebraska, two in N. C. and one in Alabama, with eight Pug Mills in N. Y., ten in Conn., and others scattered in different states.

Borden, Selleck & Co., 92 and 94 Lake street, Chicago, manufacturers and sole agents for the Harrison Conveyor, for handling clay, as well as a variety of other articles, are in receipt of many flattering testimonials in regard to its efficacy in brick and tile works. Among those who have used it and express themselves highly pleased with its work are: The Chicago Anderson Brick Co., the Bownsbury Brick and Tile Works, Bownsbury, Ill., the Lincoln Brick and Tile Works, Lincoln, Neb., Kenosha Tile and Brick Works, Kenosha, Wis., and many others. This conveyor will be found a very useful adjunct to brick and tile works, and as it is manufactured of the best material, it lasts a long time. Write to them for illustrated catalogue, now ready.

The Kansas Trip Hammer Brick Works has been incorporated by Geo. Felber, E. T. Andrews and Joseph Kraemer, of St. Louis, Mo. Under the organization just had, Mr. Felber becomes President, Mr. Andrews, Secretary, and Mr. Kraemer, Superintendent and Manager. The Company's works will be established at Wyandotte, Kansas, and the machinery, consisting of boiler and engine and E. F. Andrews' Patent Trip Hammer Brick Machine, two sets of clay crushers, etc., valued in the aggregate at \$10,000, will be furnished by the Felber Machine Works, of St. Louis.

The Kansas City Sewer-pipe Co. claim to have the largest and best equipped building in the United States devoted to the manufacture of sewer-pipe. Their plant covers 11 acres of ground. Their main building is a handsome 3 story brick with stone basement 80x250 ft., designed and built especially for the manufacture of sewer pipe, double strength culbert pipe, fire brick, drain tile, etc. The entire building is heated by steam and so complete is their system that when the thermometer stood at 17° below zero last winter they did not lose a single piece of ware.

The magnitude of the cranberry interests of the country can be appreciated from the fact that one of the largest growers in Wisconsin has just expended \$30,000 in providing for artificial irrigation. The problem is to flood 600 acres one foot deep in five hours at night on the approach of frost, and draw off the water in the same time in the morning for picking. This is successfully accomplished by two Westinghouse engines of a capacity of 175 H. P. each, which are coupled di-

THE CLAY-WORKER

VOL. XI.

INDIANAPOLIS, IND., JANUARY, 1889.

No. 1.

Written for the Clay-Worker.

EXAMPLES OF AMERICAN BRICK AND TERRA COTTA WORK.

No. 12.

THE UNION STATION, INDIANAPOLIS.

Few, if any of the great cities of our country have made more marked advance in the past year than has our own Hoosier capitol. Among the most important improvements is our new Union Station, which is one of the finest structures of the kind in the world. Those who have seen the most noted railway stations, both in America and abroad, assert that while there are some larger stations, there are none that in all respects are equal to this. Its massiveness, finish and equipments are all that wealth and ingenuity can provide. Indeed the people of Indianapolis can now congratulate themselves upon the possession of a station which has no superior.

The main building is almost square and of the style of architecture known as Romanesque, which is marked by solidity and round arches. The tower, with its battlements and pinnacle, however, is a departure from the prevailing style, approaching that used by the English of several centuries ago in the construction of their castles. The exterior appearance of the station is striking. Its three lofty stories and mansard roof raise it high above surrounding structures; while severe and simple in outline and noble in proportions, the square tower rises from the northwest corner to a height of 185 feet. The materials used in the walls are the best. From the level of the street to a height of eight feet or more all is of great blocks of Missouri granite. On this

rests the superstructure of pressed brick from famous kilns at Zanesville, O., lavishly trimmed with brown stone from Pennsylvania. There is also some excellent Terra Cotta trimmings in the tower. The walls range from two to five and one-half feet in thickness in different parts. The north front of the building is the most imposing, and faces on Jackson Place, an open court, which will be a perpetual "beauty spot" with its walks and

ing the main room which is 140 feet long and fifty feet wide with a beautiful arched ceiling of decorated glass 65 feet in height one is almost dazzled by the glitter of gold and the shimmer of marble. In each end of the room, high up, is a circular window twenty feet in diameter filled with the finest of cathedral stained glass pouring down beautiful rainbow hues upon the tiled floors and richly decorated walls. At a height of twenty-two feet a narrow

balcony extends entirely around the room. The heavy brackets on which it rests are moulded and gilded in such a manner as to add much to the general effect. All about the entire room to a height of five feet is a wainscoting of red Tennessee marble.

In the adjoining waiting rooms, ticket offices, dining room, smoking room, barber shop, toilet room, news stand, etc., the same costly decorations and finish is carried out. All the first floor rooms except the main waiting room are wainscoted in heavily paneled native oak and the furniture and seating throughout are of oak also. The building contains four large and absolutely fire proof vaults, built into walls of the most substantial masonry. Two handsome marble drinking fountains ornament the main waiting room and furnish the thirsty travelers with pure, cool water. Every modern convenience is provided and the most exacting tourist must admit that but few such resting spots is provided for the weary pilgrims of the grip.

THE satiety which comes of indolence is worse than the weariness which comes of work. The laborer generally sleeps well,



THE UNION STATION, INDIANAPOLIS, INDIANA.

flower beds and fountains. All about the station are laid substantial pavements of Brunswick asphalt on a heavy substratum of Portland cement and broken stone.

The exterior of this great structure though fine and imposing is outdone by the rich and elegant fitting of the interior which challenges the admiration of the most exacting critic. Enter-

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THE NATIONAL ASSOCIATION OF BRICKMAKERS.

Proceedings of the Third Annual Convention, held at Memphis, Tenn., Nov. 13th, 14th & 15th, 1888.

(CONTINUED)

FOURTH SESSION, TUESDAY, 9:00 A. M.

Vice President Ittner called the Convention to order.

The Chairman—Before proceeding to active business this morning, I wish to make this suggestion: That in the discussions following the different papers that will be read, that instead of a member's being catechised while he's on the floor during his four minutes' speech, that the members wishing to put questions, wait until he has finished speaking, at the end of which time, they can then put their questions. It would make the entire proceedings look more in harmony than by putting these repeated questions in a disjointed and an awkward sort of way. I desire to make that suggestion at the outset, and I hope the members of the Convention, as we get along in our proceedings, will conduct themselves accordingly; and, furthermore, it appears on the programme that we have a *Question Box* and any members desiring to have information and desiring to put his question in writing, can drop into the box which will be opened and the questions taken out and read in their proper order. [Addressing Mr. Randall] Mr. Secretary, have you got any matters that you wish to speak of?

Mr. Randall—I don't know, Mr. President, there's a paper here and some communications, but I think they ought to come under the head of miscellaneous business in the final session.

The Chairman—The next on the programme, gentleman, in its regular order, is a paper by Prof. Carpenter, of Lansing, Mich.—'The Evolution of the Brickyard.' He is now arranging his papers and is not entirely ready to be heard, and in the mean time there's a paper by Mr. Campbell, of Kansas City, Mo., that our Secretary will read while Prof. Carpenter gets ready.

Mr. Randall—This paper is the 12th number on the programme—'The Dry Press Process For Common Brick.' Mr. Campbell has been among us until this morning, but he received telegrams calling him home and had to leave on the morning train—is probably now on his way to the station; and he has given me these papers to read for him. He expected to revise this paper and deliver it in person; so he hopes you will excuse any shortcomings in the paper on that score.

"THE MANUFACTURE OF COMMON BRICK BY THE DRY PRESS PROCESS,"

BY D. W. CAMPBELL.

I presume every brickmaker here is familiar with the modus operandi of the making of brick from dry clay. How the clay being lightly plowed is allowed to dry, and then gathered into large storage sheds, where from a combination of causes it goes through a sweat giving it a sufficiency of mois-

ture to be adhesive when placed under pressure by machinery.

It is not my intention at this time to enter fully into the details covering the making of a dry press brick. I simply wish to give a few facts which may impress you as being a saving and advantage over other modes of brickmaking.

The clay, being in store, is run directly to the kiln from the machine. Thus avoiding:

1st. Loss and cost of repeated handling.

2nd. Cost of dry room and operating same.

3rd. Loss by reason of exposure to weather.

4th. Loss of time by inclement weather.

The brick are of a superior quality from the fact of the greater quantity of clay being used to make them, but which I must acknowledge adds to the expense and difficulty of burning.

There is, however, an offsetting advantage gained which in my opinion is of considerable magnitude, viz., that brick by the dry process can be manufactured ten or eleven months out of the year, or even the entire year, if necessary. True they may not be marketable during the winter months but who of us do not experience great difficulty in filling our orders in the spring, at even advanced prices, and labor where employed during all kinds of weather the entire year can be secured at the lowest price and to the best advantage.

It has been proven that a brick made by this process will sustain a much greater weight than a mud brick, which, whether absolutely essential or not, is a fact which cuts quite a figure when dealing with intended purchasers.

I shall not, as I said before, attempt to go into the details of this subject for this reason, 'seeing is believing,' and as your President and committee have favored the question of accepting the Kansas City invitation to hold their next meeting there I shall withhold the interesting information until that time, and shall then take great pleasure in going over the matter with you individually.

Kansas City as a city is the greatest wonder of the age, and has done more to advance the interest of brickmaking by using and paying liberally for all the brick that could be manufactured there than any city in the country.

I am the bearer of an invitation to you all to come and see us there, and if accepted you will find our doors wide open and with our hearts in our hands we shall greet you.

The Chairman—Gentlemen, the paper just read by the Secretary is now before you and open for discussion. Remarks are now in order, and, as on previous occasions, I hope that each gentleman arising will give his name and place of residence so that the reporter can get it in without confusion. If there is no discussion to follow this paper, Mr. Carpenter, I presume is now ready to proceed with his paper. Prof. Carpenter, of Lansing, Mich., will now be heard.

Prof. Carpenter—Mr. President and

gentlemen of the Convention: I have no doubt the Secretary selected me on the principle that I was an old fossil and would be the best one in the Convention, therefore, to present this fossilized subject to you. I shall, however, try to be brief and present the subject in a very short time. Have you considered a moment to see what the subject of the evolution of the brick yard covers? It seems to me it covers the history of brickmaking. I will read you what I have.

"THE EVOLUTION OF THE BRICK-YARD," BY R. C. CARPENTER.

The doctrine of evolution, or gradual growth in perfection, is accepted as explanatory of the mysteries attending the origin of species in Zoology and Botany. The same doctrine is not admitted to apply by many people when the subject under consideration is man. But whether the doctrine in this case is or is not applicable, whether our remote ancestors were monkeys, or apes or baboons, or whether we have even improved, mentally, physically or morally since the days of Adam, does not concern us in the investigation we have in hand. It is my pleasure to say a few words regarding the evolution of the process of brick making. There is probably no art or industry known, but what has had a gradual growth, more or less rapid, from its first inception, through various stages until it reaches its culminating point of success and perfection. This is less true of certain fine arts, such as painting and sculpture, which seem to depend largely on an instinct, born in the individual, capable of cultivation it is true, but yet dying with the individual, but is true without controversy, in regard to those intellectual and technic arts like our own, that attain perfection by gradual growth and depends on generations rather than on individuals for success and perfection.

The art of brick making is an ancient art, but it is not so ancient as some writers would have us believe. In fact, I conclude after careful investigation, that of the very ancient nations, but one, the Chaldeans, were acquainted with this art. Many of the others it is true used dried clay, in the shape of brick, and possessed the art of making fine pottery and glazed tiles, yet made no brick for the purpose of building as we use them to day. The art of brick making may not, in its simplest form, require as much skill as the manufacture of pottery or porcelain, but in every case it is an after art, an art of more recent birth, and the reason for this is not difficult to find. Some one has well said that "necessity is the mother of invention," and it is no doubt true that in every case, the art of manufacture has followed a demand. Now the demand for a permanent building, with a nation emerging from a savage state, would not come until the arts of supplying food and clothing and temporary shelter were all advanced. No nation is found without its pottery though the pottery may be coarse and illy adapted for use. The manufacture of pottery and often of elegant and perfect specimens ex-

tends back long before historic times, and long before the art of building required or demanded, a substitute for stone.

Before we can consider the process of evolution as applied to the manufacture of brick, it will be necessary to consider the method of manufacture used in ancient, even in pre-historic times. Indeed it seems to me that my subject belongs to the past rather than to the present and I will endeavor to show as well as the authorities that I could command will permit, the condition of the craft in past ages and the perfection attained in the art.

I think this general law will be found true, that in ancient as in later times, the use of brick has in a large measure depended upon the scarcity of other building materials, especially stone. We shall see that nations living great distances from stone quarries even in the earliest times have by means unknown to us acquainted themselves with the art of brickmaking, and have carried the art to great perfection. When stone could be obtained only with great difficulty then clay was used as a substitute, and we shall find that even during the prehistoric time, known as the 'stone age' contemporary nations living in countries where stone was difficult to obtain, made from clay all the implements, dishes and building material that other nations was accustomed to make from stone.

The origin of the art of brickmaking, including the contemporary art of manufacture of pottery will be found, with that peculiar people, represented in modern times only by the Chinese, but in ancient times, by strong and powerful races, found in Egypt, Chaldea and China, in the old world and in Mexico and Peru in America. This race of people ethnologically known as Turanian, possessed even in earliest times great skill as builders. To erect buildings that would endure for ages, and that would perpetuate their records, and serve as tombs seems to have been their special ambition. That they were successful in this we have only to consider, the buildings and the ruins of buildings, yet left us in every country once possessed by this race.

"The first inventors of any art are among the greatest benefactors of their race, and the bold step they take from the known to the unknown, from blank ignorance to discovery, is equal to many steps of subsequent progress." "The child is father of the man," both in the individual and in the species; and the human race at the present day lies under infinite obligations to the genius and industry of early ages.

This particular race, the Chaldeans, were driven by necessity almost, to the use of clay and it is hardly possible to see how a people could better improve the opportunity. In the first place

they had no paper, they had no substitute for paper, some genius among them discovered how easily a moist clay tile could be impressed with characters, and how imperishable it became when burned. The result was the formation of libraries consisting of clay tablets on which was engraved, in the peculiar form of writing employed the record or chronicle it was desired to preserve. Oftentimes an inscription extended over several bricks.

THE TABLETS OF THE CHALDEANS.

The tablets of the Chaldeans are among the most remarkable of their remains and when all are deciphered will throw great additional light on the manners, customs and religions of this ancient people. The tablets were made somewhat pillow shaped and from one inch to four or five inches in length; when in the moist condition they were written on and duly signed and attested. They were then baked,



E. A. POE, Vice-Pres. Nat'l Brick Mfrs. Ass'n.

then covered with a thin layer of moist clay on which was written an exact copy of that on the inner tablet. The inner side of the envelope would bear a cast in relief of the inscription beneath it. It is hard to see the object of the envelope, unless it may have been to prevent tampering with the document on the inside. Most of the tablets deciphered are deeds, contracts or engagements, entered into by private persons. These people were also in the habit of stamping their bricks with the name of the king and this custom was also followed in later days by the Egyptian kings.

CHALDEAN METHOD OF BUILDING.

Throughout the whole of Chaldea or as it was later called Babylon, stone was entirely wanting or very scarce. The nearest sandstone was probably

150 miles away, on the Arabian frontier, the road to which lay across rivers and marshes then scarcely passable. No doubt a primitive people, would be content with houses built of rushes or palm trees, but a wealthy and civilized nation as they became after a few generations, would be content with no structure unless permanent. A nation whose instincts for tomb and temple building were as strong as the Egyptians would not be content, without at least attempting to rival them in the magnitude of their structures.

The earliest traditions and the remains of the earliest buildings inform us that the material adopted was brick. The tradition in the bible informs us of the desire to erect a building that would reach to the heavens and another informs us that it was made of burned brick. The Babylonian account as given by Herodotus is as follows: "The earth was still one language when the primitive men who

were proud of their strength and their stature, despised the Gods as their inferiors, erected a tower of vast height, in order that they might mount to heaven, and the tower was now near the heaven when the Gods caused the winds to blow and overturned the structure upon the men and made them speak with divers tongues."

The magnitude of their structures is attested by the ruins still to be found, as well as by the testimony of Herodotus and Strabo, both of whom visited the country while it was prosperous. Some of the ruins are still over 100 feet high and surrounded with sufficient debris which has fallen from the upper part to easily have made them two or three times the present height. We are informed by Rawlinson that an excellent clay was found throughout this region. This when exposed to the intense sun heat of that region for a sufficient time, or still better when kiln burned, became a tolerable substitute for stone. The

baked bricks even of the earliest times are still sound and hard, whilst the sun-dried bricks, though they have often crumbled to dust or blended together in one solid earthen mass, yet sometimes retain their shape and original character almost unchanged and offer a stubborn resistance to the excavator. In the most ancient of the Chaldean edifices, as the Bowarigh ruin, we find only the unburned brick, but usually the building is completely covered with a facing of burned brick, sometimes the facing alone being 10 feet thick. The size and color of the brick vary, the general shape is square or nearly so. The thickness as given by Rawlinson is as follows: the earliest baked brick of Chaldea, and no doubt of the world, are 11½ inches square by 2½ inches thick, the baked brick of later date are commonly about

13 inches square by 3 inches thick. The unburned brick varied in size still more. They are sometimes as long as 16 inches square by 7 inches thick. Beside these regular-shaped brick, triangular brick are found for use at the corner of the walls, the wedge-shaped brick were found in arches. The arch was in common use by this people to form the covering for their drains or sewers. In cases where sun-dried brick were used for the outer facing of the walls a row of rushes formed into a mat was arranged in horizontal lines at intervals along the building to protect this brick from the weather. I have been unable to find any description of the method of manufacture of brick in these earliest times. We know from the description in the bible and by the ruins, that brick of excellent character were molded and burned. We know both from the bible and from monuments how unburned brick were made at that time in the neighboring county of Egypt. Those brick, however, were inferior to these, as except in rare cases they seem to have been merely sun dried. During the later ages of the Chaldean empire the art of brickmaking seems to have become highly developed.

The skill of a nation in the working of clay is however shown in its pottery more than by its brick, and in this art these ancient people are not to be despised. In the early Chaldean empire rude vases, exhibiting little elegance of form and no beauty whatever are common. The vases and drinking vessels of the latter period are however as elegant in form as those produced in the latter ages of the Greek empire. Whereas the first-named was made of coarse clay intermixed with straw, the latter was made of clay rivaling in excellence our kaolin. This peculiar nation was so devoted to the use of clay that even after life was spent, the body was enclosed in a clay coffin and the head of the corpse was pillowed on a single sun-dried brick. These clay coffins are remarkable, and from their great size and peculiar shape would present many points of difficulty in construction, even to potters of our own time with all their appliances.

The body was placed on a mat which in turn rested on a platform of unburned brick, around the body was disposed various utensils and ornaments. Both body and utensils are then covered by a high cover commonly 7 feet long, 2 or 3 feet high, and 2 feet broad at bottom. These covers were ornamented but slightly on the outside, but inside were plain; children being buried in smaller coffins. Another form of coffin was formed by placing two jars mouth to mouth and sealing with hot bitumen, each jar was about 2 feet in diameter and $2\frac{1}{2}$ to 3 feet in depth. In each coffin there is an air hole to allow the escape of gases. The dead were commonly buried in extensive mounds, the coffins being arranged in horizontal layers and often separated by walls of masonry. These mounds were drained by a remarkable construction in clay extending from the top to the bottom.

These drains are covered on top with

a series of perforated bricks and surrounded for the thickness of a foot with pieces of broken brick. The tiles about 2 feet in diameter have a convex form near the end to give them greater strength, and the top ones are perforated so as to receive all the moisture. These drains have been so effective in carrying off moisture that the mounds have preserved even to the present day the skeletons of this ancient people nearly in a perfect condition.

The city of Babylon, though principally rebuilt about 700 years B.C., was a brick city, containing at one time a population certainly larger than that of Chicago to-day, and possibly rivaling that of London. It is not doubted that it covered about 100 square miles of which however not more than one-fifth or one-tenth was covered with houses, and it was surrounded with a brick wall 300 feet high and 85 feet wide at the top. [Enc. Brit. Vol. III.] These dimensions were given by Herodotus, and investigation merely seems to show that they were reliable.

"The clay dug from the moat served for the bricks of the walls Herodotus says these bricks were burned in kilns. The walls were pierced for 100 gates, all of brass with brazen lintels and posts, and with two minor enclosures faced with enameled bricks which represented hunting scenes. Two other walls ran along the banks of the Euphrates and the quays with which it was lined. Each contained 25 gates, which answered to the number of streets they led into. Ferry boats plied between the landing places of the gates; and a draw-bridge, 50 feet wide, supported on stone piers, joined the two parts of the city together.

At each end of the bridge was a palace, one of which was a building of almost unequalled magnificence and size. The most remarkable edifice was the temple of Bel, now marked by a ruin called the Babel. It was a pyramid of eight square steps, the basement step being over 600 feet each way the top step containing a colossal statue of Bel.

A similar temple stood at Borsippa the suburb of Babylon. It consisted of seven steps, each ornamented with one of the planetary colors, the azure tint of the sixth, the sphere of Mercury being produced by the vitrification of bricks, after the steps had been completed.

THE EGYPTIANS.

You are all doubtless familiar with the efforts of this pioneer race in the line of brickmaking and remember well the poor success they had, when their Hebrew laborers went on a strike. The Egyptians however made only sun-burned brick, or at least they made burned brick so rarely as to have escaped the notice of their own historians and of our later day explorers. The method used in the manufacture of bricks is well known from the inferential description in the bible and from the description on the monuments. In the manufacture of pottery common and glazed, and also in the manufacture of encaustic tiles, the Egyptians were fully or nearly as advanced

as to-day. They also manufactured very beautiful and very perfect porcelain.

BRICKMAKING OF GREECE AND ROME.

It is very probable that both of these nations were acquainted with the use of burned brick, but it is equally certain that they were rarely if ever used by the Grecians, and only by the Romans in the later days of the Empire and since the beginning of the present Christian era.

The noted buildings of Greece are constructed of marble, which was very convenient and easily quarried, but a study of the History written by Herodotus, about 450 B.C., leads me to believe by his incidental references that he was acquainted with the use of burned brick. Had his readers been entirely ignorant of the process of manufacture of burned bricks he would have been likely to have given the method of manufacture of the Babylon bricks in full.

It is quite certain that for several centuries the process of manufacture of burned brick was not practiced by the most civilized nations of the world. The work of Vitruvius, a Roman architect, written at the time of Augustus Cæsar, the most glorious period of the Roman Empire, describes in full the various methods of building employed at that time, and the method of preparing the material used in building.

He gives a long description of the method of making sun-dried brick, but he evidently never heard of the use of burned brick or they would have been mentioned. It is quite certain that Vitruvius was a successful architect, and in a position that would make him fully acquainted with all the materials in use for building at that time. I will read you an extract from Book I, Chapter III of Vitruvius, explaining the method of manufacture of bricks: "Gravelly pebbly and sandy clay are unfit for that purpose, for if made of either of these sorts of earth, they are not only too ponderous, but walls built of them when exposed to the rain would wear away and soon decompose and the straw also with which they are mixed will not sufficiently bind the earth together because of its rough quality. The proper seasons for brick making are in the spring and autumn because they then dry more equally. Those made in the summer solstice are defective because the heat of the sun soon imparts to their external surface an appearance of sufficient dryness whilst the internal parts are in a very different state, hence when thoroughly dry they shrink and break at these parts which were dry in the first instance. Those are best that have been made at least two years, for in a period less than that they will not dry thoroughly. He states that unless thoroughly dried, plaster will not adhere to them."

It is not, therefore, without reason that the inhabitants of Utica permit no bricks to be used in their buildings which are not at least five years old, and also approved by a magistrate.

There are three sorts of brick, the first is what the Greeks call Didoron,

being the sort we use, that is one foot long and half a foot wide. The two other sorts are used in Grecian building the one called Pentadron, being five palms each way, and the other Tetradron, which is four palms each way. All kinds of brick have half bricks to suit. Vitruvius then describes how the bricks are bonded in order to give the wall a uniform face. He also describes a brick made of a light earth that when dry will float on water.

There is no doubt that in the later days of the Roman Empire the art of burning brick was again acquired, they learned also to make roofing tiles and drain pipes of clay. The brick made in this period are equal in every respect to those made at the present time but we are in ignorance of the methods used in their manufacture and of the style of kiln used to burn them. During the middle ages, no doubt our art suffered in common with all the building arts, but when the time for accurate history again appeared we find evidences that the brickmakers well understood the art of producing strong and well burned brick. From that time to this the art of evolution has had full sway, not however, acting so much to improve the product, as to improve the process of manufacture. We have seen how the ancient Egyptians molded brick, and dried them on the ground, and called them fit to use. In the three thousand years that have elapsed since then what have we done? Go to most small towns and you will answer we have invented a rude machine for grinding the clay, instead of tempering with a stick, otherwise we do as did the Egyptians. Go to other cities and you will say we have done more, as we have in addition a machine that fills the molds, otherwise we do as did the Egyptians. Now I believe I do not exaggerate when I say that fully one half the brick used in this country are to-day made in this way and consequently our evolution for such cases has stopped with the two inventions, the pug mill and the soft mud machine, just mentioned. This certainly does not seem complimentary to the genius of American inventors, but such is the fact. The existence of this condition of affairs is due not to the want of machinery for the manufacture of brick, so much as to the prejudice existing against the brick made by machinery. This prejudice is not entirely without reason, due principally to the fact that the clay used for machines is not properly tempered. The machines referred to here are the stiff mud machines. These machines are largely used in many localities, and unfortunately possess the power of manufacturing, whether the clay is tempered or not. The clay is delivered from

this class of machinery with a consistency, sufficient to allow of some handling when fresh from the machine. I know nothing by experience of the dry clay machines, but I have unbounded faith in them. I have not seen any dry process brick, except a few on exhibition, but I do not doubt that the quality of such brick is unsurpassed. In regard to the brick made by hand or in a similar way by the soft mud machine, as compared with the brick made by stiff mud machines, I will say that a number of tests which I made this past season of bricks made from the same clay, but by the different processes have shown somewhat in favor of the soft mud brick, and this is all the more surprising from the fact that the machine brick were harder, gave a clearer note when struck, and so far as external appearances are concerned were the better brick. The machine brick however were not as homogeneous. they contained less sand,

NOTE.—Since writing the foregoing I have made a few tests of well tempered brick made on stiff mud machines, although unfortunately not from the same clay as the previous tests, the results emphasize the necessity of thorough tempering, as the strength ran higher than those previously tested. The strength was over 4000 pounds per square inch, while one specimen stood over 5000 pounds. Such brick are no doubt superior to the best hand-made brick.

Now I believe this difference to exist through no fault of the machine, unless it may be a fault that its capacity will permit the production of brick from clay not properly tempered. With clay properly prepared there is no reason why the bricks produced from this class of machines will not compete both in quality and strength with those made by hand. Our process of evolution has not yet carried us so far as to be able to produce a brick by machinery. Our Chicago yards however are excavating by machinery, pugging and molding by machinery, transporting in part by machinery, drying by steam heat, burning by petroleum and reducing the labor of handling more and more each year. In time, our process of improvement may carry us so far that all these processes from first to last shall be done by machinery, shall be done automatically and shall be done perfectly.

There is one particular in which our art can claim great influence and great benefit from evolution of brick making machinery, and humanity should offer more thanks for this one thing than for all others combined. I refer to the improvement of the condition of our laborers, you have seen what it was in the time of the Egyptians; it was no better in the latter days of Rome, when foreign slaves labored for Roman task masters. You know what the condition was in your own yards when the old hand process was in vogue. I know what it is still in yards run on that plan, and know in many instances women, children not yet strong, do the hard and degrading labor inseparable from that process of brickmaking.

The machine (stiff mud if you please) in performing operations formerly done by this class of labor, liberates those people, it knocks off the fetters of slavery which had bound them to a task for which they were not fitted, and it should be regarded by all humanity with as much favor as the emancipator of slaves.

During the reading of Prof. Carpenter's paper, an invitation to visit the Chickasaw Armory in a body that night, was read by Mr. Randall, and on motion of Mr. McCain, was accepted and the thanks of the Association returned to those extending the invitation.

DISCUSSION.

The Chairman—Gentlemen, discussions are now in order on the paper of Mr. Carpenter.



C. P. MERWIN, Recording Sec'y Nat'l Brick Mfrs. Ass'n.

were poorly tempered and the experience of use has shown them decidedly inferior to the soft mud brick, in resisting the influences of the weather.

TABLE OF TEST OF BRICK.

Locality.	Area in inches.	Depth.	Strength per inch, First crack.	Strength per inch, Crushed.	Machine.	Remarks.
Lansing Co Brick Yard	3 3/4 x 7 3/4	2 1/8	500	1378	Kells.	White b
" "	3 x 3 3/4	2 1/8	527	2400	Sword.	On side
" "	2 1/2 x 3 7/8	2 1/8	775	2700	" "	" "
" "	2 1/2 x 3 3/8	8 1/4	942	1521	Penf'd s.c	On end.
" "	3 x 2 1/4	4	1888	1944	" "	On side
" "	4 x 2 1/4	8	1110	1490	" "	On end.
" "	3 x 4	2 1/2	916	3500	Hand md	On side
" "	3 x 4	2 3/4	1888	1250	Soft Mud.	" "
" "	2 1/2 x 2 3/8	2 3/4	1280	3840	" "	" "
" "	3 1/2 x 3 3/8	8 1/4	2060	2517	" "	On end.
Appleton's Brick Yard	4 x 4	2 1/8	937	2374	Penfield.	On side
" "	3 x 4	2 1/4	813	2666	Sword.	" "
" "	4 x 4	2 1/2	625	1582	Soft Mud.	" "

Prof. J. F. Elsom, of Indiana—I would ask the Professor, Did you pay any particular regard as to the manner in which the clay was put in the moulds, in making your tests—whether the strata was edgewise or flat?

Prof. Carpenter—In the hand-moulded brick, the clay is thoroughly tempered; it's surface clay.

Prof. Elsom—I mean in the clay that was not tempered.

Prof. Carpenter—This clay was shoveled directly from the bank into the machine. Now I would say this in regard to the color. This is a peculiarity of our Lansing clay. Our top clays are red invariably. These two bricks were made on different machines.

Mr. Purington—That brick, anyone who ever saw a brick made by that machine, wouldn't need to ask what machine it was made on. It's a machine manufactured at Lansing, Mich., about the size of a nail keg. I've always seen the clay shoveled right into it. I happen to know because I happen to be spending some \$300 repairing a building that was built of brick made on it, and I am coating it outside with a new coat of brick. The result would probably have been the same with any clay dug right out of the bank and jammed together in the machine. Yet I am inclined to think that that machine, with clay properly prepared, would make a durable, serviceable brick.

Mr. McCain—What was the name of that machine?

Mr. Randall—Mr. President, it has always been the practice and understanding that machines should not be mentioned by name in the Convention; to do that would involve us in an interminable discussion, as the same machine may have worked well in the hands of some men and not given satisfaction to others.

Mr. McCain—One moment, Mr. Secretary, just give us a chance to ask a few questions: What we can't do today, we'll do tomorrow. You decline to give the name of a machine that made this brick. I think it a very sensible question to ask and should be answered. We are brickmakers here. This is the Brickmakers' Convention and there are some of the members using machines and other members are using the machines that God Almighty gave them; they wish to be in the progressive line and of course it is in the interest of brickmakers to know an inferior from a superior machine, and in my opinion, I think the name of the machine should be stated, which can be recommended or abolished for the benefit of the brickmakers. I have got no machine. I have handled the 'Chief' machine for the benefit of that party in Denver. It don't suit me, and if there's a better one, I would like to hear of it.

Mr. Adams, of Indianapolis—I was about to call our friend to order because we have an unwritten, if not well understood law among us that we take no part—recommend no machine or say anything derogatory to the character of a machine. The only thing that would be proper on this occasion would be to mention the character of the

machine on which the brick was made.

Mr. Randall—Mr. McCain, I think, hasn't considered the matter very carefully. There are good machines all over the country that are made a failure by mismanagement and yet may be in successful operation in many other places where they are properly used. If we enter upon this discussion of the merits or demerits of various machines, we open the door for unscrupulous men to take advantage of us, and for that reason, as Mr. Adams says, 'we have an unwritten law that machines will not be spoken of either in praise or condemnation.'

Mr. McCain—I may possibly be not posted in the rules and laws of the Association, but if you have got such a rule or law as an established fact, I say it is an injustice to a brickmaker. We are here for the purpose of benefitting and advancing the interests of brick manufacturers; we are not here to make money for Tom, Dick or Harry, but to make money for the members of this Association; and if I know of a superior machine that I think is a benefit to the members of this Association, I certainly will name it.

Mr. Crafts—I wish to rise in the first place to complain of my friend behind me for having taken the wind out of my sails, and my friend Randall, for having added insult to injury. Notwithstanding I think I have the best brick machine in the world, I wouldn't for any consideration, mention it in this Convention. If any one wants to find it's name, it must be done by private inquiry.

Mr. Purington—If Bro. McCain's theory should prevail, we would stay here a good while, because if we got into a general discussion of the different kinds of machines, there would be no end to it. It is Bro. McCain's theory that has ruined so many brickmakers. Some men have recommended a machine as the best in the world, and for the clay they used, it was, perhaps the best, but a machine that I would recommend would not perhaps suit Bro. McCain.

Prof. Carpenter—I just want to make a word of explanation. I think this whole thing has been misunderstood. This is not a contest between machines at all; it was simply a contest between tempered and untempered clay. There was no particular difference between the results obtained by any stiff mud machines, but the best results are given by the tempered clay; that's the whole thing.

Mr. Eudaly—I just wish to make a remark. I heard this morning a discussion among gentlemen where some one had visited a certain place and came to this Convention reporting that certain things there had proven to be absolute failures, when on further investigation, it is found out that the very things they thought had been used at that yard, had never been in the yard at all. I have no doubt these gentlemen, if called on to express themselves on that kind of method, would condemn it. I was about to rise when Mr. McCain, of Denver, got through with his remarks. It would never do in the world for us here as a

Convention, to speak of machines by name, either meritoriously or otherwise. The very information that Mr. McCain wishes, he should have, if he seeks it, but it should not be got in the way that he anticipates getting it.

Mr. Purington—He can get that by applying to Bro. Crafts, [Laughter] or by private inquiry.

The Chairman—The further order of business is discussion on Prof. Carpenter's paper, if any one desires to speak on the subject.

Mr. Gates—I think there is one thing we all can agree on right here, and I wish to move that a very hearty vote of thanks be tendered Prof. Carpenter for his able paper. (Motion carried.)

Prof. Elsom, of New Albany, Ind., read his paper.

"EFFLORESCENCE ON BRICK—IT'S CAUSE AND CURE," BY J. F. ELSOM.

Mr. President and Gentlemen of the Association:—It is with feelings akin to those of the boy, who, on being requested by his father to set a hen, placed one dozen Pike's New Discovery kiln models beneath her "in order to see the old fool spread herself," that I stand before you on this occasion, to present a few thoughts regarding the 'Efflorescence on Brick,' to this end I have made many researches to ascertain the cause, and so far as possible in a laboratory traced out remedies.

First, in order that we may fully understand this important matter, the words of our subject must be separated by lines drawn deep and wide, from all others, then be subjected to crucial tests to avoid confusion, thus precluding the possibility of that dashing of prejudices far too common in meetings like these. Upon investigating I find efflorescence and crystallization divided by lines of demarkation drawn so narrow and thin as to be scarcely discernable by the most astute and absolutely invisible to the casual observer, thus, at the last meeting of this august body, I, to my regrets, find "papers not a few that seemingly touched tender points in papers many," caused, I might say, more by a misinterpretation of the technical features of my subject to-day than all other causes in the aggregate. My friends, I have no biased views of this matter, but pursuant to the requirements of your Executive Committee, I have considered it from the standpoint of the analytical chemist, but, let me whisper, "there is a chile among ye taking notes," and Mr. Theodore A. Randall, the Editor of the Clay-Worker (a paper we all like) and the scribe of your convention, takes special pride in rapping my knuckles now and then—more in pity than in anger I know—hence, as one of my countrymen once said in his pulpit, "I say these few words before I begin to speak."

This efflorescence, then, of which we speak is nothing more or less than one of the primary efforts of nature to establish an equilibrium, for, be it known, in chemistry we have a certain proportion of moisture which we call water of crystallization which nature decrees as necessary to hold the atom and molecules of any substance in their

proper order and condition as regards each other, hence is part and particle of such substance and is so considered by all. Next, nearly all the older elements of chemistry are more or less hygroscopic, that is possess the power of absorbing moisture other than that of crystallization, before alluded to and partially described, and is considered as an extraneous substance by the analyst, being reported as such in our certificates, this water, however may be added and subtracted *ad finitum*, some substances and combinations absorbing more and some less by each process; not so with the water of crystallization, when this is once learned—it cannot be increased by any means known to science nor will be until water and oil will mix, oil of itself is largely composed of water, its water of crystallization, but it will not absorb extraneous moisture, when the water of crystallization is by any means madeless, it cannot be replaced, but any substance or combination so acted upon will show by analysis this much less of its own water, and must be treated accordingly in subsequent processes, a point that should be well understood by brick-makers, for in seasoning and burning it is very important they should know just where extraneous water ends and the water of crystallization begins, particularly in fine goods.

The substance we call clay, out of which you, my friends, construct articles of utility and ornament, is amendable to this law in an exaggerated degree, we add water and make the hard clay soft, we temper in water, and disintegrate even the rough brick from adhering sulphur clay by means of water, it is water, water from the time we begin to dig until the dry kilns are reached, where the cubes are placed and nature's heat expected to rid them of this extraneous moisture, in many instances trusting to the sense of feeling alone to tell us when this has been accomplished, then we move them to the burning kiln and by artificial means we remove the water of crystallization, and the brick, never to contain water of crystallization again are ready for market and should remain forever free from crystallization and efflorescence and would be if clays were all alike, and this knowledge of extraneous and combined moisture was common to all manufacturers.

A few moments ago I called the substance clay, clay is alumina, alumina is a plentiful but very expensive product, and is the ultimate origin of many laboratory reagents, then your manipulations, my friends, are not of a common substance, but a combination scarcely found alike in two places, aye in the same deposit, nevertheless all of you, representatives from all parts of this country of ours, noble and grand,

make good brick, but I venture the assertion no two work closely enough to a single rule to make it sacred, it follows then that this efflorescence can be the result of but two main causes, difference in the component parts or factors in the combination used, and difference in the *modus operandi* of manufacture, causes few in number but multitudinous in subdivisions and mighty in their effects.

In order to present the subject in shape I invite your attention to two analyses, taken at random from my laboratory records, but presenting a wide difference in result.

TEST NO. 45.

Silica	- -	42.17	parts.
Alumina	- -	34.26	"
Ferrous	{ Carbonate	10.74	"
	{ Oxide		
Lime	- -	2.13	"
Magnesia	- -	4.10	"



J. J. McKenna, Treasurer Nat'l Brick Mfrs. Ass'n.

Water—combined	1.00	"
Water—extraneous	2.00	"
Sulphur	.66	"

TEST NO. 108.

Silica	- -	60.18	pr. ct.
Alumina	- -	18.13	"
Ferrous	{ Carbonate	2.00	"
	{ Oxide		
Lime	- -	10.00	"
Magnesia	- -	6.00	"
Water—combined		1.00	"
Water—extraneous		2.00	"
Sulphur	- -	.69	"

Making 100

These two samples of clay from regular customers of mine, and members of this Association, produce an excellent quality of brick, and ordinarily

made, but when, as has been done in both cases, pressed brick and sewer pipe were made from this clay, with such additions as were necessary to form a proper combination, we found efflorescence followed exposure, to trace out the cause of which was found by no means a juvenile job or cheap experiment but I will ask your indulgence while I examine a few of the constituents of these clays, and, lest I weary you will be brief.

Silica, as we find it in clay is in the form of silicon dioxide, having a molecular weight of 60, a gravity of 2.6 and is not effected by acids, or the ordinary processes of brick manufacture, hence is innocent in our discussion. Alumina, we generally find in a variety of forms, but not in the form of an oxide in clays, but in corundum and emery we do.

This substance is insensible to the action of acids, but yields readily to the action of alkalies, especially caustic alkalies. A point I particularly wish you to remember as I discuss the other ingredients of clay as I find it in the ordinary brickyard. The iron, in the form of carbonate is insoluble in all brickmaking processes, but in the form of Oxide Fe. 2O₃, iron 2 and oxygen 3, when clay containing sulphates, as the majority of clays do, is subjected to the heat of the burning kiln, the hydrated oxide is formed, and is remotely the cause of the red color of brick. In this form it is soluble in acids forming salts named from the acids with which brought in contact, and may be seen as a white powder when caustic alkalies are nicer, dark, with cyanides of potash and so on to the end of the chapter, but these two are all I ask you to note as I pass on to the lime which we find present in variable proportions in all clays, this lime, calcium, is very easily oxidized at ordinary temperatures, when we heat the clay containing it the oxide of calcium Cao is formed, and is now caustic, it being infusible, combines

with atmospheric hydrogen energetically, no little heat being generated by this energy, when carbonic acid is absorbed very rapidly from atmospheric contact, then the magnesia, generally found in the form of carbonate, but sometimes as chloride and sulphate, it fuses at a low red heat, but will be acted upon by water, especially in summer, and is dissolved readily in very weak acid solutions, such as may be readily found in a city atmosphere, where coal, containing sulphur, is used for fuel. As a carbonate we find it in brick made of clay containing the merest traces of magnesia, and being an alkali, it needs no chemist to tell you that a great dissolution occurs when brought in contact with acid of any kind,

Viewed from a technical standpoint, we find in all cases, the equivalent value of atomicity of any element, or combination of elements, subjected to processes as brick, tile and sewer-pipe manufacture enjoins, must be determined by the number of monad atoms with which it can combine, of the double atoms, any element or compound may take up an indefinite number, and no alteration of the combining powers ensue for each dyad atom, possessing two units of equivalency, must and does neutralize one unit in the compound it enters, introducing a third by formation, thus leaving the equivalence or combining power of the combination just what it was before. Assuming, then, that the clays as we find them, all had the same ultimate origin, and were subjected to the same influences natural and artificial, the foregoing would not only be a guide but a dictator in the manipulation of clay, but presenting the diverse combinations we have found, this chemical fact is merely a check but no aid.

Again, the substance we find in clay, called water, is amendable to certain well defined laws, and it makes a wide difference how gotten rid of, its molecule $O H_2$ by the loss of one atom of hydrogen, is converted into a substance analogous to chlorium, bromium and iodine, in its relation to the other elements shown in the analysis given, and when in this condition is, to all intents and purposes, equivalent to hydrochloric acid, hence when we see the action of this combination on the mortar it behooves us to have a care how and when we dry, and whether the chesions and attraction of other elements and combinations are not disturbed in ridding the clay of its water of combination, then we must bear in mind that even the extra water is never found pure in clay any more than that which we add in the preliminary processes, for even the rain which falls in the open country contains reliable traces of substances having a hurtful action on the active principle of good clays, for I have found, by means of the microscope and spectroscope, the fine salts of efflorescence (nameless for the present) sent me for examination frequently enclose mechanically in their texture particles of water by the expansion of which, when heated, the little crystals will burst, an apparent phenomenon by no means rare, and known by the name of decrepitation, and the salts of efflorescence most susceptible are those found on brick, etc., made from clays containing nitrates of baryter and oxide of lead. The same quantity of water, however, may hold several different salts in solution providing they do not mutually decompose each other, and it may be accepted as a general rule that the solvent power of water with reference to one salt is increased by the presence of another owing to combination taking place between two salts, hence when two or more salts decompose each other within the narrow confines of a single brick the results are such that precipitation cannot ensue and efflorescence impossible. But I must hasten on and leave these inter-

esting and important details for another time, it being impossible in the short time allotted me to do justice to the whole, all that can be done is to draw these brief outlines.

The principle of science, then, involved in this hydra-headed subject is nothing more nor less than crystallization, and I will be pardoned for a few moments to hint at a few principles of the process. It is a well-known axiom in crystallography that all mineral substances not belonging to the octohedral system their form is their distinguishing characteristic and it is now known that there is a relative connection between the crystalline form and the composition of compounds, also that certain substances possess the property of assuming the same crystalline form and may be substituted for each other in combination without effecting the external character of the clay. For example, clays containing mineral substances of the structure of garnet have been found by analysis to contain something entirely different. Crystals possessing the form and aspect of alum, so often found in these incrustations are found to be made up of sulphates of potence and peroxide of iron without a particle of aluminous earth, and I lately found some crystals from the walls of a building made of pressed brick in Chicago, which was supposed to be Glanber's salts, to be nothing more nor less than selinic acid and soda, hence would have been very easy to remedy in the preliminary work in making the brick. Another sample from this state was a rather remarkable incrustation, and was found to contain the crystallized salts of sulphuric, selinic, chromic and manganic acids. Iromorphus substances have often very close points of resemblance, regardless of form. Thus clays containing phosphoric barys, as in some of the seaboard southern states, may be mistaken for arsenous acid. A similar analogy is found to exist between selicium and sulphur, both being fusible at the temperature of the burning kiln, volatile, and combustible in nearly the same degree, forming with water colorless gases which are similar in odor and in their chemical relations, giving rise to analogous compounds with oxygen. The characters of sulphuric and selinic acids in particular are very similar, and the salts of these acids are equally allied. Sulphate of soda has the unusual property of being less soluble in water at 212 than at 100, and the very same peculiarity is observable in silicate of soda. The same intimacy is found to exist between baryta and stronica, between lime and magnesia, and between cobalt and nickel.

Again, in some isolated instances, I have found the clay to contain reliable traces of efflorescing zevelite, but incrustations from this cause are generally readily distinguished from all other after exposure to the air. The mineral itself is usually found in the cavities of any laminated rocks, but in the processes of disintegration by water, frosts and sunshine, may find its way into the beds of brick clay, besides the syenite and porphyry beds yield suffi-

cient of this lanmouite to effect the brick when exposed to the air. I have usually found this element present in clays from the lead or galma regions, but if we examine with the microscope the crystals will appear in the form of oblique rhomboidal prisms, though occasionally in lamillar masses this incrustation has a yellowish white color, transparent with a vitreous lustre when in the sun, eventually becoming opaque and pulverulent on exposure, especially on the southern exposures. By subjecting to analysis the following is the average results:

Harduirs	3.5
Gravity	2.3
Silica	51.98
Alumina	21.12
Lime	11.71
Water	15.05

Hence would come in the classification of a hydrated silicate of lime, and those of my hearers who chance to use clay from New Jersey, Port George, Lake Superior and various portions along the Mississippi in Iowa, Illinois, and Missouri will do well to have the lookout for this variety of incrustation, notably in pressed brick, the great trouble with it is the extreme difficulty of grading the clays that the proportions will be such as will be effectually neutralized by the remainder of the combination.

I have repeatedly been asked if this efflorescence is not largely due to the mortar used in holding the brick in position to which I have answered both yes and no; yes, when actual analysis of the precipitates shows the same elements found in the mortar; but no, as is very often the case, when they do not agree in constitution. When the mixture of caustic lime, sand and water has been properly made, a perfect silicate of lime formed, and the walls put up in a proper manner, presupposing the brick to be in proper condition, I defy the powers that be to produce by evaporation or any other action a substance of the combination usually characterising their incrustations simply because they are not to be found in the mortar free or combined.

I will freely admit that sometimes we find these incrustations of such a character as to arouse suspicions regarding the origin for instance. Since beginning this paper my attention has been called to a sample of incrustation from a wall-facing in Chicago that would naturally suggest the mortar as the cause. The sample shows:

Oxide Iron	2.14
Lime	1.68
Potash	.08
Magnesia	14.51
Sulphurous Acid	32.42
Water, extraneous	36.33
Water, combined	12.78

Making.....100.00

Mr. President, abuse science as we will, pity its struggling votaries as we may, smile at its seeming idiosyncracies as much as we like, abuse its startling disclosures to our hearts' content, have compassion on the cringing poisoner if we choose, old chemistry is a dear old study still. Its childhood

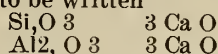
pinafors, and wild tangled puzzler are being passed, and now as a sturdy youth goes forth on its rambles again, but not to stop and wonder at those things, now simple, which caused sweating brains and despondent hearts in the days of Auld Lang Syne. It is not consistent with the present condition and strength of chemical and physical science to attempt to reconcile the above with the mortar used as cement. In many instances dolomite limestone is the base of lime, but in order to admit to this class our geologists demand nearly one-half or 46 per cent. bi-carbonate—not sulphate, mind you—of magnesia, and in this proportion is unfit for making mortar. Supposing, however, such stone be used, when the lime is thoroughly slacked we have the hydrate of the protoxide of calcium, and all the water needed for slacking being used at once. But I will add just here, if less than is required to convert all the lime into a hydrate be used, it will cause a granular powder to be formed, which will eventually show itself on the surface but not in the form often agreed as has and will be further shown when plenty of time has elapsed for the hydrate to form, not less than 48 hours, then made pasty with water and sufficient sand added to take up all the paste, i. e., the interstices between the sand grains all completely filled with mortar, say three of sand one of paste, or thereabouts, according to coarseness. In this condition, when brought in contact with the brick in proper condition, the hardening or setting will ensue without shrinkage and consists simply in the slow conversion of the hydrate of lime into the carbonate and silicate and the deposit of crystalline hydrate.

If we examine carefully the chemical reactions that ensue in the drying and subsequent exposure, made and applied as outlined, it will be found that the action of alkaline silicates upon lime, after being carbonated, combines with a certain portion of silica, if present in a soluble condition in combination with an alkali, forming a silico-carbonate of lime. Old mortar will yield lime water when digested in warm water, showing that caustic lime is always present, while I found some portions of old mortar to effervesce in dilute hydrochloric acid, yielding a stiff jelly, showing conclusively the presence of a soluble silicate of lime, beside which mortar increase in their proportion of soluble silicate of lime with age, and there being no chemical affinity between the component parts of burned brick and this element, even if the incrustations were largely composed of it, hardly probable, it would fall down or be removed by winds and rains by virtue of non-attraction and lack of cohesive properties.

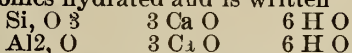
My friends, these are no pet theories of mine; I do not appear before you as an orator and with fine rhetorical flourishes strive to ridicule the ideas of others to better advance my own. The trouble has been, and now is, competition has striven to place the cause at the doors of those whom they desired to beat in the race. We must go be-

hind all this and trace out the cause, basing argument upon such foundations that will overlap on no man's land. It has been proven and shown conclusively that the process of silification not only ensues in mortar made of lime and sand, but that it takes place in a rate of process pretty constant, which appears somewhat independent of the degree of carbonization attained by the lime.

In the calcination of lime, no matter whether in the brick or mortar, when just sufficient to expel the carbonic acid from the carbonate of lime, a silicate and an aluminate will be formed which is to be written



which, when we have added water becomes hydrated and is written



But mark well the following: If the calcination has been effected with intense heat, so as to produce partial vitrification, the reaction will become more complex, silicate of alumina and silicate of lime being formed first, after which, when brought in contact with water, decomposition ensues with the formation of hydro silicate and hydro-aluminate of lime, each containing three equivalents of water instead of six, but even then the incrustation would not be permanent, though by the united action of an atmosphere impregnated with sulphuric acid may form a sticky substance on the outer wall, which, at a distance, would resemble this hateful and unsightly incrustation. I have not time, however, to discuss the question of mortar in detail, only in so far as relates to this subject of wall coatings, suffice it to say that among builders and contractors it has been good policy to add a certain quantity of alkali, either soda or potash, to bring the mortar up to the desired proportion which should be three or four per cent. of the whole, in which manner a soluble silicate to act on the lime while settling is formed.

Again, if the trouble is traceable to the clay, the raw material must of necessity contain the bases out of which the incrustations are formed. I have called your attention to the elements usually found in clays, and the faces before me indicate intellects that will readily grasp the outline. If sulphate of magnesia appear in one sample of clay the same as in another, and is the direct cause of incrustations, brick from both yards, subjected to the same influences will show the deposit on exposure, hence it is the height of absurdity to argue a kink or secret of manipulation which will preclude the possibility of its appearance I care not how treated, unless the clay containing the original base of oxalated salts, has received some addition which render the chemical reactions impotent in this respect, the white frosts are bound to show. I am fully aware that I am laying myself liable to trial before the bar of an antagonistic voxpopuli, but a noble science teaches I am correct.

The creature now has found a tongue. All are right and all are wrong. I will frankly add that in the records of my

laboratory I find many evidences, which, at first glance, would seem to corroborate each and all arguments I have seen put forth regarding the cause of efflorescence on brick, nevertheless, so long as we find these incrustations to differ in composition, so long will this diversity exist, and people look at the matter from different standpoints. If the elements of one incrustation are found in the clay, of another in the mortar, of another in the atmosphere, why we must hold each, respectively, responsible, but when, as in many cases, some of which I have hinted at, all three and even more agencies have been at work, we can not cut and make a single garment that will fit every one; it will pinch in one place and be loose in another. In conclusion, then of this part of my paper I will ask, first, have all these arguments been based on one variety of instruction? Second, were the chemical analysis made by one and the same chemist, or by chemists of equal authenticity and expertness, and, thirdly, (I wish to ask this in the faintest whisper lest a competitor hear) have not some of our friends been just a little biased in favor of their own or a friend's output, did they not think the brick of a competitor a trifle more liable than their own? My friends this is but natural, who will chide one for thinking his own the best? Thus it will be seen, as I said at the outset some little clashing of prejudices has existed, more by failure to reach far and wide enough in explorations than from selfish motives I'm sure, as I have found from actual experience with many of you but time passes and I must hasten through with what I have to say.

It has been pretty generally understood that in addition to hinting at causes I am to suggest remedies for this existing efflorescence. I approach this feature of the subject with great solicitude, inasmuch as it will be necessary to call attention again to the importance of the services of the chemist to a much greater extent in the manipulation of clay. When the thought of answering a query like this occurs I am reminded of the pious brickmaker, who, so ran the tale, after attending a convention of his craftsmen in a certain city justly celebrated for its hospitality, was induced to attend a banquet in honor of the occasion. He went, and during "the feast of reason and flow of soul," inadvertently partook too liberally of the liquid cheer furnished by the generous hosts, so by the time the deacon brickmaker started for his room he was in a peculiar frame of mind; he sought his couch, and after carefully placing his shoes on the hat rack, his hat outside the door for the porter to polish; he placed his clothes in bed, and after covering them up snugly, he hung himself over a chair back and was soon fast asleep, during which he had a dream, he dreamed of clay, of brick both plain and pressed, of tiles, of drying, burning, of conventions and chemists, but all at once he dreamed of his journey home, and while on his pilgrimage met Satan, horn and hoofs

and all, up on the mountain side. To say the good old deacon was frightened would be putting it mildly, but assuming courage he said, in accents loud and clear, "Get thee behind me, Satan." Satan said "I won't, but go with me and I will show you the wonders of my world below." The deacon paused (as any good deacon would) and thought; suddenly he said "Satan, see here." "Well," said Satan. "If you will perform these acts for me, as an evidence of good faith, then I will go." "All right," said Satan, "command;" and he leaned back against an old gnarled oak tree. "Pull up that tree behind you, Satan." Satan wound his arm around the tree, pulled it up by the roots and shook off the dirt as if it had been a weed. "Well," said Satan. The deacon heaved a sigh, but said, Satan, yon mountain peak over which I have to pass on my way home, make it level." Satan stretched out his hand and the mountain top disappeared, and one vast plane was spread out before them, and Satan said "Well." The cheeks of the deacon blanched, and as he thought of the loved ones, and the unburned kiln at home, his knees quaked with fear, but knowing the invulnerable character of Satan, he thought rapidly, and as he thought the white efflorescent walls of a building made of the deacon's brick appeared, and the deacon said, "Satan;" Satan said, "Well, hurry up—the last test." The deacon said, "Satan, tell me what will prevent brick from efflorescing?" Satan wept, and turning round the deacon was alone. Satan had disappeared, his last test had defied Satan's powers.

There are diverse ways of curing, among the very best is to employ a good chemist by the season, keep him well supplied with samples, thus knowledge to a nicety when liable to occur, and taking proper steps to render impotent the power of these disturbing elements. This, however, is more a preventative than cure, but is the cheapest as well as the best of all causes we can prevent, but cures are not always certain.

If you will not prevent, the cause being known, the following are the best applications: Washing the wall first with a strong soap solution and then with alum, or wash with water glass—silicate of potash. Another good plan is to soak the brick so as to cause the surface to imbibe a quantity of oily or fatty matter which prevents the advent of the elements that favor crystallization. In England with exceptionally fine work, the brick, when well soaked, are each plunged in a hot solution of resin, turpentine, oil or wax, and sometimes pitch, till they are impregnated sufficient to exclude air and moisture. Another process is deduced from experiments on artificial stone. It consists of treating the surface first with silicate of potash and soda in solution, following with chloride of barium, by which means an insoluble silicate is deposited within the pores of the brick. One firm is using a copperas solution with, as they claim, good results. Sulphate of zinc applied to

the wall, followed with a sulphur oil, will effectually cure.

Gentlemen, I have been a long time saying what I have, but so much is at stake in this matter of brick efflorescence that I have no apology to make, but would keep on if I dared.

I thank you, however, for your close attention, and perhaps there may grow out of what I have said, something good; if so, I am glad.

DISCUSSION.

Mr. Eudaly—I've been very much entertained by the reading of this paper—very much indeed. I think it's one of the most able productions I ever heard or read on the subject, and a great many men have been making some attempts, I think, at this question of efflorescence on brick, and a great many seem to know a great deal about it, but as yet I haven't heard or read anything that came so near to the point as this production. I think it is one of the most able we've ever had in our Association. But while I'm on this subject, as it has been already alluded to in the paper, that some of us are inclined very often to make little sport—the Professor saw proper to put that in Latin so we wouldn't understand it—that the masses might be inclined to make fun of his praises. I attempted one time to say something about a molecule over in Indiana at the Convention—

Mr. McCain—Mary who?

Mr. Eudaly—It was Molly. I believe we ought to encourage the reading of such papers. This paper will be published and while we have not been able perhaps to follow it through and read all these terms as fast as the Professor did from this paper, we should read them carefully, and if we can't make out just exactly what he means, we should go to some chemist and have it explained.

Prof. Elsom—Write to me enclosing a stamp.

The Chairman—Doesn't it occur to you that a committee of investigation is in order with reference to the remarks about the Deacon?

Mr. Eudaly—The only objection I had to the Professor's entire essay was that he left that man hanging over the chair. He may be hanging over that chair back yet for what I know.

Mr. Purington—He isn't doing it.

Mr. Eudaly—To be a little more serious—While we have had some hints as to the best method of curing this efflorescence after it has been produced—those are all very good—but what the brickmaker wants to know is how to make brick so that they will not show any of this efflorescence. We'd like to prevent it on the wall, but prefer to know how to make brick that wouldn't in any way at any time afterwards, show the efflorescence or salts that come on the surface, and that is the thing the Professor has simply said could be done by manipulating chemical forces.

Mr. Crafts, of Connecticut—As my friend, Prof. Elsom, says himself, although there isn't a member of this Convention would suspect it for a moment, I dwell under the shadow of

Yale College, and if I were to have any analyses made of clays, I think I should send to Indiana.

Mr. McCain—We have a school house built in Denver that is faced around with pressed brick and this efflorescence is exposed more under the sills than in any other part of the window. Invariably its under the stone sills all around the building. I'd like to know why that is. And another thing: What is the reason that the brick work laid with red mortar shows a great deal more of it than if laid with white mortar?

Prof. Elsom—The reason for the efflorescence showing more under the projections is because it's excluded from the ameliorating influences of the atmosphere. If it was an exposed wall, the atmosphere would have immediate contact and tend to deprive it of that efflorescence. White shows better on a red or black background than on white. There is nothing in red mortar—I don't know why I said black, I've got black on the brain. There's nothing in the elements of red mortar that would cause it to effloresce any more than white.

Mr. Purington—It has been stated by a Chicago firm that they had discovered the panecea for this evil in the use of paper between the front brick and the rest of the wall—I mean tarred paper. What I want to get at is whether by using this tarred paper the efflorescence will be prevented.

Prof. Elsom—Measurably, yes; in so far as the action of the oils and carbolic acid in the tarred paper will ameliorate the influence—that is all; there is nothing in the paper that will prevent it at all.

Mr. Randall—I think, perhaps, the Professor misunderstands the object of the paper. I think the paper will largely tend to prevent it because it tends to prevent the contact of the inner mortar with the outer mortar; the inner mortar is less pure than the outer mortar and the tarred paper separating the two would cut off communication in that way and prevent it from appearing.

Mr. Crafts—I merely wish to relate our experience. We are very fortunate; we are rarely ever troubled with what you call the whitewash coming out on the building and the only time where I have known the white to come out on our brick, was in a catholic church at Wallington, Conn., where they built these large piles; there it would come out and when the rains came, wash off again with but one exception. We can lay our bricks with white or black mortar and there's no trouble, but when we lay them with red mortar it raises the devil.

Mr. McCain—I selected bricks for Mr. Wallack—for his residence and also his barn. The barn is laid with pressed brick. The house is laid with a pressed brick probably three shades darker than the barn—made from the same clay, burnt by the same man, and in all manner handled the same; laid with the same mortar. In the barn the light brick has never showed a particle of this efflorescence. The house is covered round and round with

it. I would like to know how to account for that; the only difference in the two is that the face brick of the house is about three shades darker than the brick in the barn.

Mr. Purington—My theory has always been that the generation of this efflorescence was caused by the burning; that is, it was a chemical change that took place; excessive burning produced it in greater quantities in certain manufactures of brick. We hardly ever see any efflorescence on light colored brick, but on a very dark brick, you will see it in enormous quantities.

Mr. Randall—Were the house and barn you speak of Mr. McCain, erected at the same time or at different seasons.

Mr. McCain—Same season; same time; barn first and house afterwards.

Mr. Adams, of Indianapolis—I desire to put a conundrum to our good friend from the State of Indiana. I was much interested in his paper, and as my friend Eudaly say, there has been some sport and fun made of the technical, and to us mud-daubers, the unintelligible terms which scientific men prefer to use and which to me are about as well understood as the hieroglyphics on the pyramids of Egypt; yet the subject matter is plain and comprehensive; it is a step in the right direction. I have been asked time and again by members of the craft and outside parties, what is the cause of this efflorescence?—This chemical matter coming out on the brick? The question I desire to propound is, in the State of Indiana, common brick, hand or machine made, show but very small efflorescence; yet with our pressed brick—our St. Louis brick, I will say, used in Indianapolis and the Zanesville pressed brick used there, we find a great amount of this efflorescence; more than in common brick. In a building erected with common brick, we see but little; yet in the arch of the windows, where the pressed brick is laid, and in the corners we find a great amount. Now Mr. Fletcher made pressed brick a few years and his show the efflorescence; whether there's anything in the repressing of the brick, I don't know, but it's a fact that exists, and I never have heard a comprehensive explanation of it.

Mr. McCain—I wish to corroborate that statement of Mr. Adams myself. In all Denver where the stock bricks are made of the same clay, my own making, same handling all through, efflorescence has never shown upon a stock brick front, and on pressed brick, invariably.

Prof. Elsom—I rise now because you get so much I can't keep the run of it all. Just pardon me a moment, and I will endeavor to answer theoretically. Please don't take this as conclusive; but I will give you my theory; its based, to be sure, on a good many experimental tests. In pressed brick I find that first when its on the wall, there is a better surface to that brick—a smoother surface than with your rough brick; and when these salts present themselves, there is no influence that can be brought to bear by which they will be brought back;

whereas, with the porous brick there may be influences within the brick that will cause them to re-absorb and eventually become impotent. That is theory; it's based however on a great many examinations.

Mr. Morrison, of Georgia—I wish to say a few words. While I have never given the subject much thought, I notice that buildings built in mid-winter, fall or spring, when it's wet, are more liable to show this efflorescence than buildings built in the dry season—in the summer-time. I have seen walls partly built in the spring and the balance in the summer, and the parts built in the summer would be clean. In burning brick we know that if we have bricks that are damp in the kiln and put more heat on them before they are dry, after they are hard they have this white coating on the outside. I remember of one kiln where just two bricks in length had been set clear across the kiln, and they were set damp and the heat was pushed on them, and those two courses were whitened all over and they were the only bricks in the kiln that were. Now I wish to ask Prof. Elsom, if this whitewash is the same thing as the efflorescence that comes out on the brick after they are laid in the building. If they are identical, we know what causes it as far as the burning is concerned.

Prof. Elsom—I think they are not.

Mr. Crafts—I'm sure they are not.

Prof. Elsom—This water—what is it you call it? water-smoke. If you pay strict regard to what I said about the crystallization of water, and you will see that I drew that line of demarkation and that will answer your question.

Mr. Ittner, of Omaha—I will give you my observation. The white coming out on the bricks is caused by dampness in the brick. You speak about a hard and soft brick. You all know that a hard brick wont retain as much water as a soft brick; consequently it will go through that brick and stay there longer than in a soft brick, because you can penetrate a brick by soaking it through—a hard burnt brick wont soak a quarter of an inch. I believe if you laid your brick fit in tight joints and kept the water out, you wouldn't have this white at all. And further, I find brick work laid in frosty weather will draw dampness quicker than work laid at any other season of the year. You put up a solid wall in frosty weather, and it will stay damp for years and the brick will be wet, and you try to paper it by plastering on to the brick and the paper wont stay there. That is especially true of hard brick. With light burnt brick it wont do it because the water don't pass through. I claim that the water in the brick has a great deal to do with this.

Mr. Eudaly—I'd like to make a statement of some experiments I've tried to make with this whitewash. I at one time thought I could find out something about this whitewash business and imagined I could stop it. But to get to my experiments, I made with some white brick, not in the wall, but

piled up in the yard. We were making out of the same clay a dry-pressed brick, repressed brick and mud brick, and by throwing water on them day after day to see what the result would be, I had the water thrown on the brick—kept them wet; let them dry out both in the sun, the open air and sheds. Now I found that I never could produce any of the whitewash on the mud brick that were thoroughly burnt, no matter how long I wet them or where I dried them, except a mould which was not the whitewash, of course. On the dry pressed brick that were not thoroughly burnt, it could in time, by keeping them in a shed from the sun, produce the whitewash—keeping them wet for a long time and having them dried very slowly. I could not do this in midsummer, when the weather was real warm and the brick dried faster after wetting. On the hard burnt brick, I failed in that way to produce any of the whitewash no matter how I tried them. I experimented one entire spring and summer and fall too to try to find out what this whitewash was and what produced it. My experience has led me to believe whitewash will come out on brick that has never seen any of the lime water, and hard burned brick will not produce it as well as the soft brick and with hard mud brick I failed to get any at all. I hear that in other localities it works differently; so you see it is a very difficult question and its going to be very hard for us to apply any fixed rule to brick in all localities.

Mr. Smith, of Mass.—There's two factories in Newberryport built about the same time with the same kind of brick, common water brick, and one is covered all over with this whitewash and the other is not. One stands down on the ocean and the other stands back on dry land and its always dry and red. There's a church 25 miles from the ocean up in Georgetown, a very expensive church, and they've a bad location—put it on a wet piece of land and that church is almost invariably covered with white, while a church built on the high, dry ground always looks bright. If you'd petition the Almighty to make the air all clear, you'd have nothing on this church—it comes from the ground. A good many men talk about a glass sweating because you put cold water in it; the water that collects on the outside does not come from the glass but from the air.

Mr. McCain—I wish to state that this wet air you speak about has no effect in Denver, and these two buildings I spoke of, are built on the same lot and we have no wet climate there to differ in the winter or summer, spring or fall.

The Chairman—I wish to say a few words on this question. I noticed in one of the journals of the country a year or so ago that there is an architect in Chicago that offers \$100,000 reward or premium to anyone who will discover some means or some method by which this efflorescence or whitewash or white substance that appears upon the face of fine brick work, could be prevented, and I thought at the time

that it was a very safe offer and that he never would be divested of his hundred thousand dollars and I thought that he thought so at the time he made the offer and possibly it was more in the way of an advertisement that he made it than for any other purpose. I think that generations and ages and cycles and worlds may come and go and this will still appear. That's my opinion. Now I wish to say further that in my experience as a brickmaker and a bricklayer, that what it is that causes this is dampness in the brick; whether it gets there by immersion before being laid, or by the dampness of the season and the frequent rains in damp weather after it is laid in the wall; and if you can keep dampness and wet from your brick, you will never find that efflorescence will make its appearance; it is there in the bricks all the same, but it is the dampness applied to the bricks which brings it out, and until that dampness is applied, it won't come out. As a proof of this I want to state this: In common brick work in our city, whether its laid with the dry clay pressed brick or with the tempered clay repressed brick, it comes out all the same. If you wet the brick, and its universal in our city, to take and dip the brick in a pail of water before it is being laid, because they lay much easier and the water in the mortar isn't absorbed so rapidly after being laid. In some sections of the country, I'm told they lay the brick in a tub or vat and when they take them out, they are reeking with water. That is never done in common brick work, and its a very uncommon thing to see this efflorescence appear on the surface of walls in common brick work. It is not the fineness of the brick that brings it out in my opinion, because our brick, in the manner in which we make them, our nice red brick are almost as pretty in appearance and fineness as our stock or pressed brick as we call them, and where we lay them the people of our city, a great many of them, wishing to economize in a measure and have a pretty, neat-appearing wall, get red brick instead of pressed brick, and lay them in the same fashion as pressed brick and dip them in the water before they lay them and there the same result appears as in the case of pressed brick.

Mr. Smith—I desire to say, in the case Mr. McCain refers to, I wish to have him, when he goes back, to make inquiry if the brick in the residence structure were not immersed in water before they were laid, and that not being so particular with the barn or stable, the bricklayers failed to immerse their brick before they were laid? As if that is the case, that's the explanation in this particular case.

Mr. Purington—I move a vote of thanks to Prof. Elsom for his able and instructive paper. (Motion carried.)

The Chairman—Mr. Crafts, of Connecticut., will now read his paper on "Improved Methods of burning brick.

Mr. Crafts read his paper.

"BURNING BRICK," BY S. P. CRAFTS.

One of the burning questions of the day is: "How shall we best burn our brick?" I have been requested to read a paper on this subject I must confess that I do not know. But I wish to know, and this paper is written to call out all the knowledge in this convention on the subject.

And taking the axiom that "there is something to be learned from every fool," I am encouraged to do my part, after which I hope to hear from the wise ones in this convention. He who applies cast iron rules to the burning of all brick will be apt to be reminded of the experience of the doctor who summed up his experience in two cases by noting down that pork and cabbage will cure a blacksmith but kill a tailor. In other words the different conditions and character of the clays with which we work inevitably call for different treatment.

The strength of the clay, its refractory character according to the presence or absence of metallic oxides the tendency to warp or swell or white-wash or fail to give a good ringing sound when tested, all enter, as well as length of time, into the problem of what is the best means of sending to market a good, sound, well vitrified article.

Then comes the common question: "How to accomplish this result at the least cost of fuel and labor?" In the long ago measured by thousands of millions of years the divine omniscience stored away for the use of creatures as yet uncreated, the light and heat, rays of the sun in the form of fuel oil. Then came the coal measures, and afterwards as suitable to the use of the dawning intelligence of primitive man was given the forests, which more easily supplied his immediate needs. In the reverse order of this creation came their use. Afterward came coal and now after coal comes the reproduction of light and heat in the shape of fuel oil and gas, and mankind is to-day struggling with the problem of how best to control and develop the energies of these latest born or discovered but very aged infants.

As it would be a long and difficult task to give the values of different fuels in all localities, I will take the cost in southern New England.

One cord of beech wood, worth \$4.00, contains 17,065,000 heat units; one ton of bituminous coal at \$4.00 contains 31,227,000 heat units; four barrels of fuel oil, 40 gallons each at \$1.00 per barrel, at 6 pounds to the gallon, gives us 20,160,000 heat units.

Here, then, we have data based on the cost and heat values for one locality, the variation from which will not be large from any of the brick manufacturing centers in that region, in which I include the Hudson River, New Jersey, etc.

Now, which shall we use? I do not consider gas in this paper for I do not know anything about it, and it is not practicable for most of us. The most cost for labor in burning, and the least cost for fitting up is with wood, but it involves the greatest cost for fuel. The greatest cost for fitting up, and a

smaller cost for labor in burning is with coal, but with the least cost for fuel if you could utilize all the heat it contains. With oil, the cost of fitting up is more than with wood, but less than with coal unless you build permanent walls, and even then it is somewhat less and the labor in burning is least of all. But the cost of burning with oil is less than with wood, but more than with coal, unless you can utilize a much greater per cent. of the heat of the oil than that of coal. Now, it is claimed that you can get all the heat there is in the oil, at least 19,000 out of the 20,200 units, and that with coal you get but 8,000 or 8,500 out of the 14,300 units. You must remember, however, that these are claimed as proportions in the pound weights of the two fuels. When we consider the cost they more nearly approach each other; 12 pounds of oil costs five cents and 12 pounds of coal costs 2 1-7 cents, therefore to get at the relative values we must estimate the work of 12 pounds of oil and the work of 28 pounds of coal; 12 pounds of oil at 19,000 heat units gives 228,000 heat units as against 224,000 @ 8,000 or 238,000 @ 8,500.

From this it seems that there is very little difference between the cost of coal or oil unless some other consideration intervenes. But there is a consideration of the lesser expense of fitting up for oil, the saving of time in burning, the fewer hands required, and the ease with which you can increase the heat. You may keep your bricks at a dull red for any length of time and fail to burn them hard, but if you can in a shorter time with oil get the requisite temperature, then you do the work in less time and at a saving of fuel, for the radiation of the heat of a kiln in six or seven days is no small item. It seems to me that in this shortening of time and saving thereby is the principal argument in favor of oil over coal, but it becomes us to consider whether the difference of the percentage of heat utilized under a boiler when burning oil or coal will hold good when diffused in and through a kiln of brick. I do not think it will, for a kiln seems to take up all the heat of combustion in either case, certainly until the last stage of burning when the blanket of steam ceases to hold down the heat as in the earlier stages, a condition very different from the smokestack of a boiler.

In summing up I should say that wood is the simplest and most expensive in most localities, certainly in localities where the greatest number of bricks are made, but that between coal and fuel oil it is an open question yet to be determined by a longer and more thorough test.

For myself, I have used coal over four years at a cost of about 50 cents per 1000, and am now trying oil in the latter stage in burning to get a larger volume of heat and to deepen the color of brick when burned. We have just finished burning a kiln of 19 arches, containing 451,000 brick, using 67 tons of coal at \$4.25 per ton, making the cost per 1000 63 6-40 cents. This kiln of 451,000 brick contains 15 ton of coal-

dust as against 18 tons in the same number of brick made last year. This amount, and the height (six brick higher than last year) may account for the longer time and greater relative consumption of coal than usual; two hands do the work. We set 52 bricks high to economize the shed room, but are satisfied that 46 high is better and more economical.

In this paper I have not attempted to tell anything that is new to every one in this convention. It has been written to awaken an interest and draw from the members such data as will help us to form more just conclusions with regard to the best method and material. I should like to learn from my brother manufacturers just what they use, what it costs, and what it costs per 1000 to burn their bricks. I am willing to give all the particulars of my experience, failures and all. The wrecks that strew my path (of what I once thought would prove to be just the thing) in my search for *ultima thule* of brick burning form a debris not to be sneezed at.

The reasons given above for the higher cost of burning do not hold good, for we have since burned a kiln of 474,000, made in precisely the same way and set the same height, at a cost of 50 cents per 1000. Cause, better coal.

Mr. D. V. Purington—I was assigned yesterday to lead the discussion on

BURNING BRICK BY CRUDE OIL,

and it seems to me that perhaps now is as appropriate as any time to begin that discussion, after the reading of Mr. Craft's able paper, which is simply a chapter from his experience. I have not come here prepared to read a paper or give you any particular facts or figures on the burning of brick with crude oil, for the reason that another gentleman, who happened to be my brother, was assigned to read the paper. Circumstances over which he had no control prevented him from being here. Just before I left home I happened to receive from my superintendent of the yard in Indiana, a little note relative to a kiln of 250,000, giving the facts of the difference between wood and oil. That is the only data I have. I stuck it in my pocket to hand to my brother. I'll read that. This is really a private letter addressed to my brother; it is imperfect in one respect, and if I had asked him for it myself I should have had it a little differently. He doesn't give the cost of labor; he simply gives the difference in labor in favor of the oil. Kiln of 250,000 using wood and coal: 40 cords of wood at \$2.50, \$100; hauling to kiln at 25 cents per cord, \$10; 90 tons of coal at \$3, \$270; unloading same, \$7.50; cleaning up the ashes, \$5; difference in labor, \$10; total, \$402.50, equals \$1.61 per 1000 for fuel and the extra labor. That of course seems a little forced. He should have either not given the labor at all, or given the entire cost of labor. At this place where we make pressed brick, we have been unable to find any burner we could dry off sufficiently slow with oil to get the steam off without commencing to burn the brick, so we have dried off partially with wood.

Same sized kiln with oil: 15 cords of wood at \$2.50, \$37.50, (against 40 cords wood); 350 barrels of oil at 62 cents per barrel, \$217; making steam, 10 tons of coal at \$3, \$30; hauling 15 cords of wood at 25 cents, \$3.75; unloading coal 75 cents; total, \$289.00, or \$1.15 per 1000; saving, \$113.50. The above figures are about as close as I can get them, and nearly accurate. I have figured the cost of coal at \$3 and the oil at 62 cents, which may not be exact. Now, in our yard in Chicago, common brick—and I want to say right here, that efflorescence in our Chicago brick doesn't bother us any; you can't see it if it does come out; you don't care anything about it. I have burnt this year a little over 28,000,000 without using a stick of wood or a pound of coal—entirely with oil. Of course my brick are artificially dried. We have taken out of each brick from the time it was made till it was set in the kiln, a pound and a quarter of water, so they are about as dry as can be got, practically. We start one side of the kiln three or four hours before we do the other, and we get the heat up just as fast as we can get the draft started. When we first start, of course without the arches being heated at the sides to form a combustion, we have to burn more oil. Our fire is oil, and we burn on an average four days, where the average was about seven days and a half before. I burn in kilns of 24 arches each, and where we used five men before we now use two. We have no ashes to haul away, no coal to unload. We unload all our fuel with a little steam pump, and is then ready to be drawn by gravitation from the tank to the kiln. I can state unequivocally that I know of no inducement other than a pecuniary one, that would lead me to go back to burning, common brick, artificially dried with wood or coal. I'm not up on heat units, and shall endeavor to talk in a language that brickmakers can all understand. I don't know a unit of heat; wouldn't know a dozen if I should see them right here. The cost for fuel has been, for oil, an average of 36½ cents per 1000. In the beginning before we understood oil and its uses, we used a great deal more, and we are all the time improving upon it. Any science so new as the burning of brick with crude oil, is susceptible of great changes, and I expect it to improve for the next ten years. The exact total cost of burning brick so far with me I have been unable to ascertain, for this reason—I take my steam from a stack of three boilers, and the same steam from the three boilers is used for running my machines in the day time and also for my kilns, and for burning brick, so I have been unable to divide the amount of steam I use for burning brick, and the only way I can get at it is relatively, and my figures show the total cost for labor fuel, oil and coal for burning brick this year has been 53 1-3 cents as compared last year with 92 cents using wood and coal.

Mr. McCain—Are the bricks burned just as well with oil?

Mr. Purington—If the cost of fuel was the same; if it cost me just as

much for oil and wood to make steam, as it did for wood and coal, I would still burn with oil. My arch brick, aside from the first 18 inches, are the best I have in the kiln. There isn't a check end brick or discolored brick, or anything that would damage them; they are really the best in the kiln.

A Member—Is there anything in the use of oil as fuel that militates against water-smoking?

Mr. Purington—Yes, sir; so far there has been. To use a burner with an aperture sufficiently small to make a light fire results in clogging that aperture with carbon. The hydro-carbon burner in New York that Mr. Smith represented last year is in many respects, I think, the most complete oil burner I have ever seen. There were five apertures about the size of a knitting needle in that.

A Member—Do you find any difficulty in handling your fires with oil and getting your centers, outside corners and ends, and throwing your heat in any part of the kiln you desire?

Mr. Purington—No, sir; except that we have adopted this in our furnace kilns—our Wingard kilns. The first three kilns we burnt we had a good deal of difficulty, and now to get the heat we let one side go very light and fire the other heavily, so that the two flames, instead of meeting in the center, face, just as with the old-fashioned way.

Mr. Hale, of West Virginia—Do you bring the temperature to a higher degree?

Mr. Purington—I have illustrated that to a great many gentlemen who have come to see me, by showing what I can do, and I can set those bricks to running like water in a July sun. I can get any heat I want inside of two minutes.

Mr. McCain—You use slack coal in Chicago?

Mr. Purington—On the outside courses.

A Member—After you start the fire, and the brick begin to sweat, which all bricks will do, will there be any difficulty in getting the fire up through them?

Mr. Purington—None at all; and there is one advantage in the use of oil over the use of coal: In forcing your fire it is an absolute impossibility to choke your kiln with oil and you've got no ashes; no dust.

A Member—Isn't there smoke from oil?

Mr. Purington—Only in the beginning.

Mr. Cubbins—Do you meet with any difficulty in drying off common brick with oil?

Mr. Purington—We dry our brick artificially.

A Member—What is the average cost per arch to arrange a kiln to burn with oil, taking into consideration the pipe, the burners, tank, and all the appurtenances—to arrange the plant.

Mr. Purington—I can't give you that in detail. I did give my brother the figures and he had it all arranged in detail. I can tell you the gross amount very nearly: to fit up a yard where I am making 35,000,000 of brick it costs

\$2,500. That included the steam pipes, tanks and everything complete. I have an oil pipe running the length of the shed for a supply pipe, and have a valve to take the oil as we want it.

A Member—In case all the brick-makers and clay workers of the United States use oil as a fuel, would not the Standard Oil Co. and others take advantage of us and put the price of oil so high we couldn't use it?

Mr. Purington—Well; it's pretty hard for them to have a chance. I investigated this before I went into the oil business. I found there was sufficient oil now above ground to last the United States for five years, taking the consumption of 1887 as a basis.

Mr. Crafts—Mr. Osbourne told me the supply was inexhaustible, and if even they should put up the price of oil, you can go back to coal very readily.

Mr. Purington—The oil we are using is Lima oil—crude oil, and up to this time the Standard Oil Co. have never been able to discover any process whereby they could refine that Lima oil, and it is a question with the Standard Oil Co. what they shall do with the oil.

Prof. Elsom—You spoke of clogging up with those nozzles. Did you ever try super-heating the oil to avoid that?

Mr. Purington—It's a little dangerous. I want to remind all you gentlemen that heating oil is dangerous.

Prof. Elsom—Well; I'm using it in my blowpipe, and had that same difficulty about clogging up, with a low fire, and there is no more danger in super-heating the oil properly than there is in running it direct without super-heating it.

Mr. Purington—The reason I said I thought there was danger is from the fact that so little heat applied to oil will cause evaporation and the formation of gas. At Pullman they had oil run into a barrel and drew it from that to the kiln and in that barrel they had a steam pipe; the burner went along sometime during the night to see how low the oil was in the barrel and they have never yet discovered his lantern.

Mr. Ittner, Omaha—I would like to ask Mr. Purington how far he carries his steam and what temperature it ought to be.

Mr. Purington—The boilers from which I make steam are near the center of the shed and they are 300 feet long; my boilers are 116 feet from the shed back to the engine; that makes to the extreme end of the shed over 600 feet.

Mr. Cubbins—What is the pressure?

Mr. Purington—Eighty to eighty-five pounds; and our judgment is, after the experience of this summer, that 100 would be better.

Mr. Cubbins—I'd like to ask you one question in regard to your insurance: In using oil, do you interfere with your insurance? Are you charged any more?

Mr. Purington—No sir.

Mr. Cubbins—Do you consider it more hazardous to use it?

Mr. Purington—I do not; I've been burnt out twice this summer, for the

first time in sixteen years; but neither fire was due to crude oil; one caught from a man filling a lantern from the barrel in the engine room and the other caught from a wood kiln.

Mr. Ittner, of Omaha—Why wouldn't it be a good idea to place coils of pipe under your kiln and let your steam pass through that?

Mr. Crafts—I have done that.

Mr. Purington—I have done the same thing and expect to continue doing it, in cold weather; but really in the summer we fail to discover any benefit from heating the steam. This summer some man who pretended to have a good deal of knowledge of chemistry, told me you couldn't convert water into gas with less than 2,000 degrees of heat.

Prof. Elsom—He does just as I do when I lie. [Laughter]

Mr. Purington—Will you tell me the amount of heat required?

Prof. Elsom—I don't remember, but its less than that.

Mr. Purington—It had occurred to me that if his statement was anywhere near correct, we got no benefit from our steam. It had been one of the theories of men advocating and advertising oil burners, that the steam mixed with the oil and air gave us a great deal better result. My idea is that the only object that steam accomplishes for us is in spraying the oil, and it seems to me that if that is true, we could with compressed air, spray the oil very much cheaper than by using the steam, especially if the steam goes through our kiln and passes off as a vapor. We don't know whether this steam that goes off from our kiln comes through the burner or from the brick. If we are using steam that doesn't help us in burning the brick, it certainly must be a detriment. Do you catch the idea? Is that steam, after spraying the oil, of any further use to us?

Prof. Elsom—It is, certainly—seven-ninths of one per cent. use to you.

Mr. Purington—It certainly isn't a detriment?

Prof. Elsom—No sir; there would be that much advantage in using steam, over compressed air.

Mr. Purington—Suppose the compressed air is heated?

Prof. Elsom—It would be equivalent to steam—both alike.

Mr. Crafts—I had that hot air bee in my bonnet and thought it was a good thing and ascertained that the Norwalk Iron Works made the best air compressor in the country. I went down there and stated my case and they told me they didn't think it would be money in my pocket to buy it; they told me it would take a 40-horse-power boiler to run the compressor giving 40 pounds pressure.

Mr. Ittner, of Omaha—Does anyone here know what amount of heat it takes to burn a brick.

Mr. Eudaly—Well, Mr. Chairman, I've been trying to get the floor on another subject. I dislike very much to be taken by surprise. Some combinations of clay will burn at 1200 degrees of heat; it runs on up. 2200 is the average for common clay. Some run as high as 3000. When you get to

that, it's all guess work. Fire-brick-makers will talk earnestly about 4,000 and 5,000 degrees and all that sort of thing; but the theoretical heat you can get out of fuel won't run as high as 5,000. The clay can be burnt so it won't go to its original state at 1100, 1200, 1300, 1400 degrees in heat, but to get a good brick, you've got to run it to 2200 degrees. With reference to air and steam for vaporizing the oil. That will be a question discussed considerably in the next two or three years. Most of the oil burners—all that I know anything about, are vaporizing with steam. I know of one burner recently patented, now in use, that vaporizes with the air—cold air. I watched it very closely indeed, and I am inclined to believe that vaporizing with the air will prove to be the best way, and I'll give you my reasons. You want to vaporize steam. What for? In order that the air may mix with it in the burner. I'm saying nothing about hydrogen gas in the water, which is less than one per cent. in the steam; you want to vaporize the oil so that the oxygen of the air will burn it.

Mr. Purington—Which will mix the most readily—oil and steam or oil and air?

Mr. Eudaly—That's just what I was trying to get at. Let me start again. If you vaporize the oil with the steam, you have yet to mix the air before you get the burner; that's what I mean; if you vaporize the oil with the air, you have the mixture already made; that's just the difference exactly. You've got to do it; therefore I hold that vaporizing the oil with the air is the best. Then comes in the question, how much will you add to your fuel by adding the gas of the hydrogen to the steam, and that has been said to be not equal to one per cent. Then the question is, the friction of the steam and the appliance to make the steam—the coal to make the steam and the appliances—will that not more than overbalance that much, less than one per cent? I believe that it will. Now another question. This oil burner that I have examined, and I have been watching it very closely; seen it in many of its tests ever since the inventor commenced it. They haven't succeeded yet in preventing that burner from clogging up with air. I didn't expect that. I felt that by using air, it wouldn't clog. They have been using cold air. The air clogs in the burners and they have to clean them out. It has been suggested that hot air will not clog. I can't see why. A great many people think if you have air highly heated, it will prove a great benefit in burning fuel. That is a great mistake. You can heat air up to a certain temperature, and it is very beneficial. If you heat it very much, it takes more space; you've got to put more into the fuel; put it in faster to supply your fuel with oxygen, and the friction and time, etc., much overbalances the heat you get in the air. Furthermore, if you attempt to heat your air beyond what you can heat it with your appliance, you have to have a furnace for heating air; so when you

speak of heating air beyond what you can heat it with the latent heat from the furnace is a mistake. I believe in heating it from the furnace all you can, but to get up some separate appliance is certainly a mistake.

Mr. Cubbins—I would like to ask Mr. Purington,—Do you have any difficulty with the clogging up of your burners during the burning of your kilns?

Mr. Purington—Not a particle; but this question of Mr. Eudaly's has called to my mind an experiment I made with a burner not very different from the old Canada burner. Coming in to the chamber was a T and coming into that T was a quarter of an inch pipe with a little funnel on the top to suck in the air, and that obviated the flitting motion of the old Canada burner. It burned steady. I am inclined to think there's a good deal more air in conjunction with oil than a great many of us realize.

Mr. Crafts—I gave the impression that I didn't think oil was the cheapest. There are two bricks burned with oil entirely, at a cost of 63 cents. Here are two bricks burned with coal supplemented with oil at a less cost. I don't think there's any difference in the hardness but you can see that there is a difference in their color.

Prof. Carpenter—I wish to say one word, in regard to the method of oil burning. They think they've got through experimenting at the Detroit Steel Works, in the use of oil, and are now burning about 15 car loads a day in order to free themselves from the Standard Oil Company. They bought their own oil-well and made their own cars. They think it costs them a little money to do this but they are independent of the Standard Oil Company. They have had two accidents there and two friends of mine who went into the oil business both met with similar accidents. I think the accidents could both have been prevented but are liable to happen by introducing oil in any process. The accidents were caused in both cases by allowing their steam to go down. Their flow of oil was free and all right but in this process of oil burning it is necessary to have a very heavy head of steam in order to atomize or spray the oil and the pressure required is considerable and the higher the pressure the better are the results. Now I think this thing is very clear and ought to be put down—that you do not gain anything except, as Prof. Elsom has put it, by the use of steam over air or any other substance except by the heat you introduce with it. If we put heat into the kiln with the steam we gain some thing. Prof. Cooley, at Ann Arbor, this last year, has been making some tests of the different burners to find out how oil compares with coal. He hasn't come out very well, and I am very much discouraged about putting it in the large plant we have. The best evaporation he has got is 12 pounds against a theoretical evaporation of 18. We probably don't get over 6 or 7, where we ought to get 14 or 15. The oil doesn't show up very well on that test, and in our region at 63c a barrel,

it hasn't proved a very great saving over coal; that is, for steam purposes. One question was asked in regard to the temperature it takes to burn brick. Personally I don't know anything about this, but Gen. Humphrey, of Adrian, a few years ago, measured carefully the heat it took to burn brick in various parts of his kiln, and I was looking at the specimens the other day. He got a very light, salmon colored brick of the Adrian clay, with a little over 1200 degrees, and at about 1800 he got a pretty sound brick; whereas at 2700, he got a very hard burned brick as dark as that [illustrating] and one that was burned too hard; that is certainly burnt too hard to be of the best strength, and that was about the temperature that he got with that clay.

Mr. Eudaly—I want to make one remark about this high temperature of steam. I just want to call your attention to the fact that Mr. Purington states that using steam for vaporizing the oil, he finds a high pressure produces better results than a low pressure and so also Mr. Carpenter. I believe a low pressure of steam evaporates more water in the boiler than a high pressure. If that be the case, when you carry a moderately low pressure of steam, you are carrying more of the hydrogen in your kiln than with the high pressure of steam.

NOT ON THE PROGRAMME.

Mr. Blaffer—Mr. President and gentlemen—There is a man in our midst who for years has labored very zealously in the behalf of our Association, and while we have all been away, probably not thinking of what was going on, he has been laboring very hard toward the success of this convention, and to him I may say all is due. He was among the first to suggest this idea of bringing the brickmakers together from the North, South, East and West to come once a year and exchange views as to the best methods of manufacturing brick. In recognition of his services, I will present, in behalf of the Association, a little token of our respect and esteem, and in presenting this to Mr. Randall, I hope he will not accept it merely for the intrinsic value but the sentiment that accompanies it. He is a very good man, no doubt; but when far away from home, he needs watching, and in selecting this token, we have tried to pick out the prettiest face for the handsomest man.

[Hands Mr. Randall an elegant gold watch and chain.]

Mr. Randall—Mr. President and gentlemen of the convention: This rather knocks me out. Mr. Blaffer has been talking to me for half an hour about another matter—something about a resolution referring to the ladies present. [Comes to a stop.]

Mr. Eudaly—Perfect quiet while he makes his speech.

Mr. Randall—I can't do it, gentlemen; words can't express my appreciation of this token. [Stops again.]

Mr. Purington—What's the matter with Randall?

Chorus—He's all right.

Mr. Randall—Well, gentlemen of the

convention, I never have received anything, I think, in the way of a token, that I shall esteem and keep as I will this; not for its intrinsic value, but for the token of friendship. [Pauses.] Friendship is a jewel beyond all price, and I prize it as such next to my wife and children, I think I shall cherish this above everything else almost that I shall own in this world, and I assure you that no effort of mine shall ever be spared to make the corresponding secretary worthy of your confidence and friendship. Gentlemen, I thank you.

Mr. Blaffer—There are two ladies in our presence, the wives of Mr. Ittner, of St. Louis, and Mr. McCain, of Denver, Colorado, who have honored us with their presence on this occasion, and I hereby move that these two ladies, in appreciation of their visit, be made honorary members of this Association.

Motion carried by a rising vote.

Mr. Crafts—I only wish to say there is only one drawback, and that is, it was sad that they had to come here and keep watch over their respective husbands. Laughter.

Mr. Purington—I know its getting late, but there are one or two resolutions I've handed the secretary, and one letter I'd like to have him bring up if he can withdraw his attention from that watch long enough to do it.

Mr. Randall—The first paper is the report of the committee on resolutions on the death of Robert Thomas.

IN MEMORIAM.

WHEREAS, Robert Thomas, a member of Association, passed from works to rewards in August last. Therefore:

Resolved, That in him the Association loses one of its oldest and most valued members.

Mr. Thomas came to this country when he was twenty years of age, and by his ability, honesty and unswerving integrity made for himself a name and reputation of which any man could well be proud. Of him it was always said "his word is as good as his bond," and the Association unites with his sorrowing family and friends in mourning the loss of a kind husband and father, an honest, reliable business man and a good citizen.

Resolved, That these resolutions be spread upon the records of the Association, and that the Secretary be instructed to furnish a copy to the family of our deceased brother.

Committee. { D. V. PURINGTON, Chicago,
J. C. ADAMS, Indianapolis,
W. A. EUDALY, Cincinnati,
A. S. BLAFER, New Orleans,
C. W. EDMUNDS, Memphis,

Mr. Adams—In seconding the adoption of the resolutions, I desire to say, I was a neighbor of Mr. Thomas; knew him long and well; although of foreign birth, he was a man of intense American thought and convictions; as a competitor in business, he was honorable, upright and manly. He was tender-hearted as a woman and as simple-minded as a child; a man that I respected and honored in all the relations of life. I second the adoption of the report.

Motion carried by a rising vote.

Mr. Purington offered the following resolution:

Resolved, That the President and Recording Secretary be, and they are hereby appointed an Auditing Committee to audit and draw warrants on the Treasurer for the expenses of this Convention; and, further, that the Treasurer is hereby instructed to pay all

bills audited by this committee and certified to as correct by the President of the Association.

Motion seconded and carried.

Secretary Randall—The next is also a resolution:

WHEREAS, The National Association of Builders have, through their Secretary, forwarded to each member of this Association a copy of the proceedings of their last annual convention. Therefore,

Resolved, That the thanks of this Association be tendered to them for their kindness and courtesy.

Adopted.

Mr. Purington next read the following:

Resolved, That the proceedings of this Convention be published in pamphlet form and that the Corresponding Secretary be authorized to have 500 copies thereof printed at the expense of the Association.

Mr. Purington—I move the adoption of the resolution. It was the action of the Builders' Convention, the report of their proceedings published in pamphlet form, that awoke me to the necessity of publishing our proceedings; and I want to say further,—Mr. Randall, through the Clay-Worker, has heretofore published a very complete report of our conventions; but if we go on with our conventions and increase the number of papers, we'll have to get some other paper because Indianapolis won't be big enough to publish a paper of that kind; and I happen to know that the expense of making that publication has been pretty large, and I have introduced this resolution with a view that this year the expense of the stenographer shall be paid by the Association; I think it no more than right that this Association should pay the bills it contracts. [Members—Right! Right! Right you are!] And its left now with the Recording Secretary and the President to audit those bills.

This resolution was discussed at some length, several members speaking on the subject. Mr. Miller, of Chicago, suggested the propriety of publishing advertisements in the report and in that way cover the cost of publication but the idea did not meet the approval of a majority of the members and the resolution was finally seconded and carried by a unanimous vote.

On motion the Convention then adjourned to 2:30 P. M.

FIFTH SESSION.

THURSDAY, NOV. 15, 2:30 P. M.

Convention called to order by President Speed.

Secretary Randall—The first paper in order on the programme for the afternoon session is "A Modern Brickyard," by Chas. E. Eckert, Walkersville, Ont. As Mr. Eckert is among the missing we must take the next paper on the programme, an essay—"Pavers," by J. J. W. Billingsley, Indianapolis, which I have. He is known to nearly all our old members as the senior editor of the "Clay Worker," and I am very sorry he is unable to attend here in person.

Mr. Randall read the paper.

"PAVERS."—BY J. J. W. BILLINGSLEY.

The improvement of streets and highways in this country is receiving a very considerable degree of attention;

more especially in the older settled sections of the country. "The best pavement for the money" has racked the brains of the city authorities of more than one city. The pavement that will be most durable may not be desirable on account of the very rough character of the traveled surface, the wear and tear of the vehicles, and the liability of the draft and carriage horses to get lame or become stiffened where there is a want of elasticity, makes such pavements objectionable.

There are bowlder and stone pavements that those traveling the streets will avoid by driving two or three squares out of their way to their business. Streets improved with wooden blocks are good enough for three or four years without repair, after which they may be used a few years with needed repairs; then the rotten wooden blocks have to be removed altogether. Wooden paved streets are expensive, short-lived and on the whole unsatisfactory.

Asphaltum makes a smooth, elastic, springy street, but a few years will wear the surface into holes or depressions, and these are very difficult to repair, in fact, repairs are seldom satisfactory, besides, they are expensive.

Latterly, in this country, the use of brick for paving streets has been receiving some attention.

Sixteen years ago, at Charlestown, W. Va., they put down a few squares of brick pavement which have been subjected to heavy travel, and we are informed that they have stood the wear well. Since they have tested them they are generally improving their streets by paving them with brick.

At Steubenville, O., they have had a test of eight years on the principal street of that city. The pavement so far has exceeded the most sanguine expectations. The writer visited Steubenville in May last and examined the street that was first paved and was agreeably surprised to see that it looked as if though it had been laid only a year or two. The wear of eight years was hardly perceptible.

Fourteen years ago Mr. Heafer, of Bloomington, Ill., laid one square of brick pavement on the west side of the Court House. The writer has frequently visited that city since that time and has examined the pavement, finding it all that could be desired. Since they have been convinced of its merit the city authorities have improved several of their principal streets in this way.

We are informed that Galesburg, Lincoln, Peoria, Springfield, and other cities in Illinois, have put down many miles of brick pavement.

Decatur, Ill., has several miles of streets paved with brick, to the writer's own knowledge. In fact, all of their principal streets have been thus improved. This city commenced the use of brick eight years ago. At one time they had five miles of their streets and sidewalks under contract for brick pavement.

In Ohio brick are being generally introduced in the smaller towns and cities—at Columbus, Cleveland, Akron, and other places.

We have heard of no dissatisfaction

where hard burned brick have been used. We heard of one square in part that was paved with soft brick, in Columbus, Ohio, by some interested stone contractors, that was taken up and replaced with West Virginia hard burned to keep up the reputation of the pavement. Within the past year a section of one of the principal streets in Washington, D. C., has been paved with West Virginia paving brick.

The introduction of brick for street paving in our large cities would meet with general favor if it was not for some of the all-wise engineers. Mention brick to one of them if you want to see a frown mantle his face. "No sir! No sir!" he says, and then takes a hammer and a common burnt brick and hits the brick, and, knocking off a piece, says: "There now, don't you see it won't do?" He forgets that a square block of stone with sharp edges and corners, subjected to the same test, would likely be as easily defaced.

BRICK PAVEMENTS ARE NO NEW THING.

It is no innovation of the past decade of years. It is no new fangled invention gotten up by hard pressed brick makers to tide over a dull period in their business. It is not a new thing in this country, and it's less so in the Old World.

Prof. Roberts, of Cornell University, N. Y., a year ago, in a conversation with the writer, said: "I wonder that our people do not use more brick in the improvement of our streets and highways. In the Netherlands the highways are generally paved with brick. In a ride of several days through the country visiting various herds of Jersey cattle I did not drive over more than six or eight miles of dirt road. Some of the highways have been paved for more than a half a century, and they require little repair and make splendid roads to travel over."

THE KIND OF BRICK REQUIRED.

The brick should be hard and not easily chipped or crushed. There is no denying the fact that some clays are better adapted to the manufacture of pavers than other clays. But it is also true that in many localities clays may be found that are well adapted to this use. A clay that will burn to a hard body, having a tough fibre, (if the term "fibre" is admissible in distinguishing the adhesiveness or toughness of the product).

There are large brick plants in Eastern Ohio and West Virginia that make a specialty of the manufacture of paving brick. We are further informed that they make a specialty of the manufacture of pavers at Galesburg, Ill. The Decatur Tile & Brick Works, of Decatur, Ill., manufacture them in large quantities. But it is also true that in the burning of common brick a great many pavers might be selected from the kilns. We feel free to say that clays well adapted to the manufacture of this desirable product are so abundant that no one manufacturer is likely to have a monopoly of the busi-

ness in any very large section of the country.

BRICK PAVEMENTS ARE DESIRABLE FOR THE FOLLOWING REASONS:

1st. They make a smooth pavement over which heavy loads may be drawn without a jolt. Draft horses are able to draw a third larger load over such a pavement than over a bowlder or rough stone pavement. In addition both team and wagon are subjected to less wear. For light vehicles there is a most striking comparison. It is a pleasure to sweep along without a jolt or a jar over the smooth, springy brick pavement, and a tribulation to drive over the cobble or rough stones.

2nd. Brick pavements are desirable because they are durable. The many instances already referred to are sufficient without adding another.

3rd. The abundance of the material that is at hand—every street, sidewalk and highway may be paved with brick and an abundance of material would be left in store.

4th. Brick pavements are easily repaired. There is not a pavement that can be named that can be so easily repaired as brick. If a single brick is too soft, replace it with another, and the work is done.

5th. Brick pavements are less expensive than others, if durability, wear and tear of teams, vehicles and comfort are taken into account. The cost of construction ranges from \$1.00 to \$1.40 per square yard.

CONSTRUCTION.

First of all, the roadbed should be crowned a little and well underdrained; no springy or spouty places should be allowed to interfere with the solidity of the foundation. This may be done with a tile drain at the foot of the crown, on each side of the roadway or street. To a solid roadbed add three or four inches of sand, then a layer of brick laid flat, two inches more or sand, followed with a layer of brick set on edge and the interstices filled with sand, and a small covering of sand on top. The latter will soon wear off. Another method is to set one layer of brick on the four inches of sand and settle with mauls and cover with sand as before. This is the cheaper method and it is good enough. Where sand cannot be had in sufficient quantity the bed for the brick is made smooth and even and soft, or pulverized for one or two inches on the surface, the brick set on edge and settled a little, and the joints or interstices filled with the fine earth.

Again, others use plank laid upon a roadbed brought to the desired grade, placing the plank upon sand or upon a clay bed, setting the brick on edge in a light layer of sand, then filling the interstices as before.

HOW TO GET PAVERS INTO GENERAL USE.

Lastly, how shall we get everybody to favor the use of pavers in the improvement of our streets? is the question. Every brick manufacturer can see that if pavers come into general use for improving the streets of our larger towns and cities, the demand

would be immense. There would be lively times about the brick yards. One suggestion in this line and the writer will wait the further pleasure of this convention. It is this: Let every enterprising brick manufacturer get the city council of his town or city to allow him to put down the length of one square of brick pavement with the condition in the contract that if it proves satisfactory in one year's use, then the town or city is to pay the cost of its construction. Select hard burned brick and lay them perfectly, and, the writer's word for it, pavers will be well and favorably introduced into general use.

The convention will take notice that we have suggested that "enterprising" brick manufacturers undertake the work of laying the introductory pavement. We do this for the reason that those who are slovenly and easy going in their habits would botch the job and be a hindrance in the progress of the work. The importance of the matter demands the best efforts of the best men of the craft. With true Roman courage find a way or make it.

The Chairman—Gentlemen, you have heard the paper of Mr. Billingsley read. If there are any members present who desire to take up the question it is now open for

DISCUSSION.

Mr. Crafts—I was going to say that in our vicinity we have such quantities of stone admirably adapted for macadamizing that I suppose it would be difficult work to introduce that material, and that on the score of economy it wouldn't be advisable, though I am perfectly satisfied that we might use swell brick, called lammy brick, those brick we use now to line the outside or sewers with, for where a man wants to put a driveway into the street across a crowded sidewalk they put those brick on edge for the passage of their heaviest teams. I never heard any complaint about their wearing out, but the question struck me whether a brick pavement was more liable to have sunk holes in it like stone, and whether it could be mended the same way.

Mr. Randall—There is a gentleman present who I think is pretty well informed on this question, and while he is interested in a certain method of paving, still I think he might speak on the subject. I refer to Mr. Hale, of Charleston, W. Va.

Mr. Hale—In 1870, in brickmaking, among other things, starting with a Girard machine, I made a very hard, durable brick. We had a fine clay to begin with, and finding they were so hard, I proposed to the city to put down a block of paving with the brick. It was considered an absurdity by everybody—worse than useless, but they said if you choose to spend your money on it, you can do so. I did just what Mr. Billingsley recommended—put it down at my own expense. It stayed there three years, and during that time the city was so thoroughly convinced of its value that they authorized me to put it down at their expense, which I did, and they were so much more pleased with it that they

dug up this first piece of pavement in order to regrade the street, and paved that whole street with it, and every year since then they have added to their brick pavement. They now have miles of it, and, as an evidence of how it is esteemed there, a gentleman in Ohio wrote to one of our citizens there, a very large property holder, whose premises were paved with this pavement, and asked him what he thought of it. His reply was this: "On political questions, tariff questions, religious questions, and so on, we are at variance, but upon the question of brick pavement there's but one opinion held; that is unanimous that brick is the best and cheapest pavement in the world." I have a pamphlet with me here giving the certificate of United States and railroad engineers and city engineers and business people there in regard to this pavement. In paving there are three or four different methods known to me. I first laid it with boards. I was the first one to use boards to serve as a foundation for the pavement. Our method is this: grade the street up to the proper convexity, take about three or four inches of sand, smooth that with a template drawn over it, then put down oak boards. We use that because it is very abundant and cheap—our cheapest timber—laid down longitudinally of the streets. The reason for that is our city is only a small place and it isn't finished yet; and, like all new places, they are digging it up every year for water and gas mains and other purposes, and boards are laid longitudinally so you can dig up the middle or side of the street, and just take up the boards and lay them aside and put them back, and you wouldn't know they had been taken up. A number of our streets have been cut up several times. One street, the first that the city paid for, was laid in 1873. That pavement has been in constant use, and the streets above and below, for a long time were merely mud streets, and the teams would go several squares to go over that street, so that it had more than the usual amount of service, and in 15 years, with the exception of repairing it where it has been taken up and put down imperfectly by gas companies, etc., there hasn't been \$15 of repairs on it; it certainly will last 15 years more. Our brick are very hard—harder than usual. I also brought some pieces of the oak board. To-day that board is as sound as when it was put down, 15 years ago. Certainly the brick and boards are durable to that extent. A number of other cities have already adopted it, some on an extensive scale, some on a small scale. We have contracts now for next spring to put down our pavements in other places. Another method of paving alluded to in this paper is one which was introduced lately in Bloomington, Ills. Mr. Sefer and Major Gregory put down a piece there which was a double course of brick—one laid longitudinally and the other across the street at right angles, filled in with tar and sand. It made an excellent pavement, and I have seen in several cities where it would wear as well, stand up as well. But

my impression is that the board is better than two courses of brick. They approach nearer to the cobble-stone pavement. In cobble-stone pavement each stone stands on its own bottom, and the result is they are frequently being repaired, but with brick placed upon a board like that, you can't punch it through that board or sink the whole board.

Chairman Ittner—Do you have anything between the boards and the brick?

Mr. Hale—Yes, sir; an inch and a half of sand—about the best quality of sand. The object is chiefly, that brick burnt for paving brick are more or less rough. It is not necessary or desirable that they should be smooth. Any little inequality in the brick is imbedded in the sand, and the smooth surface comes on top, and the top of the pavement is just as smooth as this floor, producing pavement smoother, cheaper and more durable than asphalt.

Mr. Crafts—Isn't it better to lay the boards longitudinally in every case?

Mr. Hale—No, sir; I don't know that it would be in every case.

A Member—You lay your bricks crosswise, don't you?

Mr. Hale—No, sir; generally in herringbone style, across each other.

Mr. Crafts—Is that good for horses' feet?

Mr. Hale—I don't know that there is any difference. I never knew a horse to slip on that pavement in my life, and I've asked people if they ever heard of a horse slipping or falling and they said never.

The Chairman—What is the cost of this paving?

Mr. Hale—Cheaper than any other pavement, sir; the materials are so cheap that they can be put down cheaper than any other system. It is undoubtedly cheaper than a macadamized road, because you can't keep macadam smooth and level, and every year you've got to be filling up the holes. At one time you have it in holes and at another time the fresh broken stone; but a brick pavement is smooth all the while, and in Charleston it has lasted 15 years, and I think will last 15 longer. With us the cost has been \$1.15, \$1.25 and \$1.40 per square yard, the brick being figured at from \$5 to \$10 a thousand. They were then smaller than the usual size, now they are making them 8x4x2½.

Mr. Crafts—There's no place then but what the material would be just as cheap?

Mr. Hale—I suppose so. Our clay is very suitable for this purpose, and some machines make a very much better paving brick than others. A gentleman in my neighborhood has a very expensive brick plant for a small town; he had one of the Auburn Machines, with which he made a very excellent brick for paving streets. Last year he threw it out and put in a very expensive machine costing \$2,000; he thought he was going to get a very superior brick; filled two kilns and burnt them, and he didn't get a single paving brick out of the whole lot and sued the man that sold him the machine, for ten thousand dollars. A

great many people say, 'Why not have a different shaped block?' and there have been several patents for different blocks, but I think when you depart from the common brick you make a mistake. When you use a common size brick there is not a brick lost, but with special sizes there is great uncertainty about getting the brick properly burnt, but in ordinary kilns, and ordinary size, whatever isn't good for paving brick, is good for building, and there's no waste, so I think a brick pavement is the cheapest. Brick is universally distributed; clay is found all over the world, and while some clays are better than others, good clay can be found in almost any section. One gentleman tells me the clay in Chicago has a great deal of lime in it. That would be very objectionable for a paving brick; but certainly not far from Chicago and cheaply accessible to Chicago, there is abundant clay which would make admirable paving brick; no doubt about that. I inquired at Bloomington of the distance and price there; I suppose bricks could be shipped from Bloomington to Chicago, 120 miles, for a dollar or a dollar and a half. I know we are shipping to Kanawah, 250 miles, for \$2.00; not because they haven't the material there, but because they are not prepared for making them there. There is another method or two of laying the pavement, by putting a foundation of broken stone six or eight inches deep; that is much more expensive pavement than the board, and if there's a wet place in the pavement, it gets a little soft and will go down in the pavement. A great many people ask, "Won't heavy loads break up your pavement?" I answer "No." Charleston is the capital of our State and some heavy stones are used in the construction of buildings there—14 feet long; 3½x2 feet; and I will say here that there are no broad tires on the wagons—all narrow tires; and stones of that sort are hauled for a mile over brick paved streets; some of the stones weighed eight or nine tons; eleven men got on top of one; it was so large a stone that people came all along the street to see what effect it would have on the pavement, and not a brick was broken so far as I know. So with large iron safes, weighing eight or ten tons. Therefore I think that pavement will stand any amount of pressure that may be put on it. No pressure put on that brick [illustrating] with a smooth floor under it, could break that brick by pressure.

A Member—Is this process of laying pavements with the boards patented?

Mr. Hale—Yes sir. The company doesn't lay any pavement, but they license other people to lay it themselves.

A Member—Are they in use anywhere besides Charleston and Columbus?

Mr. Hale—In Wheeling, Parkersburg, Point Pleasant, Greensboro, N.C., and there are several other cities now that are preparing to lay it next Spring as soon as the season opens. At Columbus, O., they didn't have the brick and are shipping there from Charlestown, Parkersburg and Middlebrook, Ohio.

Prof. Carpenter—I wish to say just a word on this paving question. About 17 years ago Mr. Gresham, of Detroit, at his own expense, constructed in the city of Detroit at the intersection of two streets, a brick pavement in the hopes of introducing the paving in that city. That was in good order for eight or ten years after it was put down and withstood a very heavy traffic of teams going both ways. The construction was very simple, consisting of hard burnt handmade brick soaked in hot coal tar. Mr. Morrissey claimed this soaking in hot tar made the brick impervious to cold water and increased its strength. That pavement stood very well, but through one of the idiosyncracies of the city council, he never could get it introduced.

Mr. Ellis, of Atchison, Kan.—I'm in the paving brick business in Atchison, making this brick; it is what we use now. I've investigated this carefully in different cities using brick. We put two courses of brick, first grading our street a perfect grade, lay four inches of sand, gauge it and lay brick lengthwise, then put on two inches of sand and gauge it and lay the brick crossways. We have a street there that's been down a year; there's no settling in that street anywhere; I've been over it recently. I never heard of a hard burned brick being effected by frost. What we aim at in a paving brick is to get a brick with hardness and strength; we do that by having a great deal of silica and oxide of iron. One of those brick there was burnt a little too much. We have to burn them like that brick; keep the toughness of the clay in with the hardness. They burn to the glaze and melt. I've corresponded with a good many engineers. Cleveland, O., invested \$140,000 in one brick contract; Bloomington and Peoria are using it; St. Joe is agitating it and Kansas City is putting in a block on trial, and most all those Western cities have other companies paving with brick or intend to in the spring. I'll guarantee that if you put that brick in boiling water it will not change the looks or the scale. I'll further say there's no patent on our process or the brick either.

Mr. Smith, of Newburyport, Mass.—I wish first to ask the gentleman if he had brick transported 200 miles for \$2 a thousand?

Mr. Hale—Yes sir.

Mr. Smith—I wish to say that in Nashville they lay brick one single course on merely planking the ground, put on hot coal tar, fill up the crevices, put a little sand over it, and that's all they want. They may put something in the tar, such as the gravel in a roof, and its right solid together; its been down eight or ten years you can't see that anything has ever been on it.

Mr. Miller, of Chicago—I've watched with interest the different kinds of pavements put down in Chicago. We have a wooden pavement which is very satisfactory, but on account of its softness it wears out. They are putting down granite now. The difficulty with that is it's slippery; it very soon polishes. You can't polish brick. On brick sidewalks our shoes wear out

sooner than on other pavements. That proves that a brick pavement presents more friction between the horses' shoe and itself than anything which is or may be polished; so I claim that that is the reason a brick pavement is going to come into use; because, in the first place, on account of its smoothness, its good for the wheels, and it is good for the horses' feet because it gives the friction beneath the horses' hoof; the material itself is smooth enough to allow the horse to pull and it still presents that sand paper like surface.

Mr. Crafts—I have no doubt the gentleman is quite right, but he comes here and stands us on our heads at once. It's never been supposed to be a conceivable thing that brick was suitable for a pavement, but I think as far as the argument's concerned, he's got the bulge on it; and what the gentleman has just said as to brick not polishing, is one of the strongest arguments in favor of it. Whoever has traveled in New York, has seen the horses come down, and there's no remedy unless you sand paper the street pavement, and that won't last; but it is true that there's no such thing as a slippery brick. I don't see the advantage of filling the pavement up with coal tar.

Mr. Miller—It's to keep the water out of the spaces between the brick.

A Member—What is the objection to filling them with sand?

Mr. Miller—The water would go through and run down to the boards.

Mr. Hale—In Charleston we use no tar whatever; we have very fine sand, and that sand is packed down and makes an impervious joint, perfectly water-tight; the engineers couldn't be convinced that sand was impervious to water—thought water would go through sand. In Charleston we have very fine, sharp sand, and we have no difficulty at all in making those joints perfectly water-tight; then every wheel and hoof and foot that goes over it is caulking that sand down tighter and tighter and tighter until it's perfectly impervious to water. An engineer from some other city was there a short time ago and couldn't be convinced that was the case and after testing it in different parts of the street and finding that the sand was clean and dry below the surface, he went to a puddle in the street where the water had been standing, at the intersection of two streets and dammed it back with mud and dug down through the pavement and cut through the boards and the sand was clean and white as the day it was put there.

Mr. Purington—How about the noise?

Mr. Hale—It's less noisy than any except asphalt and I don't think it is as noisy as asphalt; it is the most noiseless pavement, unless it be wood.

Mr. Eudaly—I feel just like saying a word on this paving business, as I've been making it a study for a number of years—little bit interested directly in that line. There are a great many questions to be considered. One of the most perplexing ones is how to convince town councils that paving brick are at all suitable for streets. Two or three years ago it was next to an im-

possibility; the idea of putting brick down to drive over seemed to be perfectly absurd, and you will find now in a great many cities they are still of that opinion, while in a great many other cities they are putting in brick pavements. Just a word as to the foundation. I have heard the theory advanced by scientific engineers that the foundation for a brick pavement should not be solid as a foundation would be for granite; that the foundation should have some spring. They give two reasons for this argument; one is, it would be easier on a horse's hoof, as is the cedar block, having some spring; and another is, that when the foundation has some spring, that the blow of the wheel or hoof on the brick, will not break it so easily and that it is much better than either. One thing, however, that the engineers insisted upon is that the water must be kept from under the brick so that they will not freeze and bulge up. I missed the first day's convention, but the next morning I read the proceedings in the papers, and one of the things made prominent in some of the papers was that the brickmakers were gentlemen. They seemed to be very much surprised in Memphis that they were well dressed men; they expected to find rough, clumsy sort of fellows that didn't know very much and never ought to. I wear the same old clothes I wore four years ago; I didn't get a new suit this election like some of you fellows. The trouble about the whole business is that people not actually making brick are not up to the brick business; they don't appreciate a brick; they have not been brought to understand what a brick is. I sometimes get wonderfully provoked to see the absurd ideas architects will advance with reference to the crushing strength of brick. Did you know that if you build a wall two feet thick with excellent mortar with ordinary brick, it will stand its weight 200 feet high; I suppose double that.

Mr. Crafts—There's a chimney at Ansonia, Conn., built with brick, that is over 200 feet high.

Mr. Hale—There is one in Cincinnati over 300.

Mr. Eudaly—The main point I wanted to urge in this connection was simply this; that city councilmen and people who are not accustomed to handling brick, have a way of looking down upon the brick men and the brick business. The time will come when bricks for pavement will be in much greater favor in this country than granite. There isn't any question about it, for the very reason advanced this evening. You take the large territory of our country and it has clay all over it. You can scarcely go anywhere you can't find brick clay to make a fair paving brick of. I can find clay to make paving brick all around this town, and if the people of Memphis would wake up and make a paving brick, we wouldn't have so much mud to walk through. I expect that's the first bad word that's been said about Memphis in this convention, and I said that because we are about to go away. A brick mustn't be burnt absolutely to death to make a paving

brick out of it. I not long ago saw a city council condemn some brick because they weren't burned as black as a hat. If you made them out of white clay, they'd want them burned as black as a hat. A brick burned too hard is not so good for paving or anything else, as a brick moderately burnt; it chips off and will break.

Mr. Crafts—I had a dispute with the city engineers at New Haven with regard to a brick being hard enough for a sewer; I broke out $\frac{1}{4}$ and it stood 1100 pounds without a crack in it.

Mr. Ellis—I wish to differ with the gentlemen on the polishing of brick. There's a brick [showing a brick] that will polish equal to marble. I was at Galesburg last summer and took up a brick out of the street that had been there four years. The surface of that brick is as fine a polish as marble. And another thing I wish to say—I've got no interest here, only I've had a hard fight with our city council on the paving matter and have won. We had asphalt out there and cedar blocks to fight. I made it a point to circulate my own petition. I had this advantage—I claimed a home manufacture; not a dollar would go out of the town except for coal; I had something to give employment to labor in the town. With this argument the community in general, with three-quarters to nine-tenths of the property owners on the street were with me and the city council couldn't go back on that. There's a brick that would break a granite block of the same size in two. That brick is a reburnt brick—a salmon brick put back in the kiln and burnt; that's our best quality of brick—something that the iron is alive in.

Mr. Purington—I apprehend that if we investigate this question carefully, we'll find there's as much difference in clay for making a paving brick as in the burning of the different clays. I'm satisfied we have no clay in the immediate vicinity of Chicago that can be successfully made into a paving brick. I've seen the Galesburg clay, and it don't make any difference what sort of machine you make them on, if you burn them right. They make brick on a little sausage machine. Our Chicago clay would be worthless if made on the same machine; but their clay has a peculiar faculty or quality that enables it to become vitrified without melting. If we get our clay in Chicago to a vitrifying heat we are almost sure to melt it, because the two points are so close together that I believe it will always be found an impossibility to draw the line; so while I believe in bricks as a pavement, I think there are certain localities that will have to import their brick for the purpose.

The Chairman—It is now suggested that we leave this paving brick question, which is a very important question, but the time is growing short, and we will now have to proceed to other matters.

Mr. Smith, of Newburyport, Mass., in response to calls, then addressed the convention on

BRICKMAKING IN NEW ENGLAND.

Mr. Smith—Gentlemen, I took the

trouble to come pretty near 1,500 miles to attend this convention, because it seemed to me to be an important step in the propulsion of civilization—the manufacture of permanent articles of building materials superior to any other articles now known to the civilized world. I always felt as though it was important for a man to do something which would be lasting and substantial. We all know that burnt clay is the last thing to be lost in civilized society and it is the last thing to be destroyed. Now, gentlemen, I have been in the business some time, and after making brick by hand for 25 years, I adopted the machine brick business and have been running the machine from that time till now. Brickmaking by hand is generally abandoned by most of the manufacturers. But no machine will apply to all places. I am satisfied that in manufacturing brick in our section of the country, the machine we now use is superior to most any other we might adopt. I have had a great many circulars, and have visited many large machine shops and brickyards, from Bangor to New Orleans, and from Boston to St. Louis, and I see but very little advantage in them over a machine that can take the clay from the bank, and form it into a brick suitable for the work with the simple process of running through one machine. I don't know how you can do it cheaper than that. This machine that I run; we put the machinery into a dry house and the men are not exposed to the weather or the sun in hot days. The only men that work out-doors are the men that have to get down in the clay and bring that in. I find it a nicer and cleaner business—much more comfortable than any kind of a mud machine that can be made. To illustrate the matter, I thought I'd bring a brick, but when I started to do it it looked to be too much of a task, so I took one out into the shop, took a cold chisel and struck it off, so; and you see how square that comes off. We don't make a very large brick for the reason you must make brick according to the size of the men. A man eight feet high and weighing 400 pounds, would make a much larger brick. We can make a brick about as strong, or about as weak as we are a mind to, by putting in more clay or more sand. To show you the strength of some of the brick we can make, when they built the water-works in Boston, I made brick, and made a contract to deliver 20,000 a day. They sent down a man to examine and look at them, and I made some of them so hard that the man took one of them and with it drove a railroad spike into a cedar post, clear up to the head, and you couldn't see the mark of the spike on that brick. In Boston they don't want a hard brick, they prefer to have them soft, because they will soak the moisture and soak it much quicker, and they have got used to that style and don't like anything solid and hard; and the architects of Boston won't admit machine brick into their buildings. They rejected those brick, but I sent them to New York and had them tested by Mr. Haskell, the great-

est engineer in the United States. I suppose you all have heard of him, anyway—and his test shows that these brick will stand 14,000 pounds to the square inch, over twice any hand brick you can find, yet for all that Boston condemns them. It's only by selling them a little less than the usual price that I can get them in, and some particular contractor who has a great influence can put them in. Therefore, I have labored at a great disadvantage for years—have been kept down. The architects of Boston are more ignorant of clay than any other one thing in the whole world. You ask the best chemist in the State of Massachusetts what a brick amounts to and he will tell you the last thing to dissolve in a brick is sand. The only way I can burn my brick is to put sand between them, and it won't melt. I won't discuss that part about the burning of brick at this time, and what is burnt brick. I wish this convention could be held in the eastern part of the State of Massachusetts, that we might present the importance of this matter. I once went to Philadelphia, and never was so astonished in my life as to see how ignorant they were.

[Mr. McCain stands up. A voice—What's the matter with McCain. Great applause and laughter.]

Mr. Smith—In Philadelphia I went down to a yard and there they were wheeling clay, and they had a man striking one brick at a time with his hand, and a little boy laying them off on the ground. If there's anything slower than that, I don't know what it is. They have this old wheel going around; it seemed to me a thousand years behind the age. Right in the vicinity of Boston, they even daub the mud in their hands now, in this civilized time. You've got the power of steam and machines of all kinds where brick can be run off with some speed. I believe that the manufacturing of brick is one of the most important industries of this time. Build a frame structure, and you have to spend half the money for insurance, and the other half keeps the building in repair. I belong in a little bit of a city where nearly all the buildings are wood; even a mason, when he builds a house for himself builds it of wood. There has not been three brick houses built there in 40 years.

Mr. Purington—How large is it?

Mr. Smith—14,000.

Mr. Crafts—How long have they been asleep?

Mr. Smith—It's just waking up. In the western part of Massachusetts the people and the architects will admit that brick can be made by machine, but in the eastern part and in Boston the architects can't be convinced of anything.

A SWIFT MACHINE.

Mr. McCain—Old Philadelphia is my native city, where I was born and raised, and I can't, with good grace, sit still and think that old quaker concern behind the times. I wish to state to this convention that our good brother, Mr. Smith, has not visited some parts of Philadelphia, for I can tell him that in 1862 the first Chambers

machine that was erected was put up on Gillespie's yard in Philadelphia, and is working till this day, and although I am in strong favor of machinery I've yet got to see the city that can turn around and beat Philadelphia for making a day's work of brick on their yard, one single brick at a time, without any bottom in their moulds, or can put better brick on the face of their buildings, except Baltimore, and their brick is made in the same manner. I am proud of this machinery, and of the strong invitation that Brother Smith has given us, that we may go to that land of intellect and intelligence, because we all know that Massachusetts is the father of the United States in the educational line and the intelligence of humanity. I am proud of that invitation, and if the majority of the convention will say so, I'll go there too; if you meet in heaven I'll go after you. Now, gentlemen, when the ward machine is got up—I'll never have a better opportunity than now to tell it to you, and I will let you see that even Boston is behind the age. There is an old gentleman in Denver, Colorado, who has got a machine that I saw with my eyes and timed it with my watch, and another gentleman with his watch, and it made 16s brick in one-half-minute, [Great excitement laughter and applause, continuing through the remainder of the sentence] and it made its own bricks, sanded its own moulds, and there was nothing attached to it but one pair of horses and a man. [Great applause, laughter and cries of oh, oh, oh.]

Mr. McKenna, of Chicago—And did the machine collect the bills, too?

Mr. McCain—That's an impertinent question. [Laughter and applause.] Gentlemen, on the honor of a brickmaker, and that can never be disputed in a brickmakers' convention, I am speaking the truth. Now, to explain that matter a little further, I will state to the gentlemen here—and, by the way, if there's a delegate from Michigan here, that state gets the credit of producing that old gentleman, for that's where he belongs—this old gentleman sent for Mr. Brewer to come to his house, he had a model of the machine, a working model. It was about the size of that chair if you cut the back off. The bricks that he made, I didn't measure them, but from the best of my judgment from looking at them, were about two inches long, a full inch wide and three-quarters of an inch thick. The clay was tempered the same as if you were going to make it by hand, previously, and the clay was thrown in a hopper at the top and then the machine moved, and it dropped eight bricks on the floor at a time with what is called loose-bottom moulds, so that they dropped about this way [illustrating]. Now, I contend in reference to the machine, that the brick was equally as good a test as you could ask of a machine, because if made the proper size to turn out a proper-sized brick, it will make a larger-sized brick than that little one. Now, gentlemen, I'm not advocating the machine, because the old crank that's got it will never sell it, give it away, hire it, or

anything else, but I only wish to tell you what may be done out at the base of the Rocky Mountains.

The Chairman—We will now take up the next in order on the programme.

MISCELLANEOUS BUSINESS.

Secretary Randall—The first matter for consideration under this head is a series of invitations from the Kansas City (Mo.) Board of Trade, and several prominent residents of that city, requesting us to hold our next annual convention there. These invitations are presented through our Brother Campbell, and are very cordial and earnest.

Mr. Smith, of Omaha—I don't know what the by-laws of this Association are regarding holding conventions.

Mr. Randall—The by-laws state that the place of meeting shall be determined by the executive committee, and announced not less than three months previous to time of meeting.

On motion of Mr. Smith, of Omaha, a vote of thanks was tendered to the Kansas City gentlemen for the interest manifested, and the resolutions ordered read and spread upon the records of the Association.

After a lengthy discussion the question of the time and place of holding the next annual meeting was referred to the executive committee as provided in the by-laws of the Association.

Mr. Purington—We have in Chicago a prominent Republican politician who attends all the conventions. I never knew one he didn't attend, and introduce from one to ten resolutions, and he has gone for years by the name of Resolution Burke, and I am afraid I shall get the name of Resolution Purington; but I have one more, and I introduce this resolution with a great deal of trepidation. So far our meeting has been very harmonious, and I dislike to introduce a resolution that may produce discord among the members. At the same time I feel it my duty to proceed:

Resolved, That the thanks of this Association be tendered to the reception committee of the local manufacturers, the citizens of Memphis, and the proprietors of the New Gayoso hotel, for the magnificent manner in which this Association has been entertained during its stay in Memphis.

Resolved, That the thanks of this Association be tendered to the Avalanche and the Appeal of this city, for the full and accurate reports of our proceedings they have published.

Resolved, That we shall leave the city of Memphis with our hearts filled with pleasant recollections of the most courteous treatment and generous hospitality ever extended a similar body.

Mr. Randall—Our President is apt to gain a reputation as a humorist if he starts out by speaking as though such a resolution as this is going to stir up turmoil and dissention. I want to add an additional word as to the press of Memphis. I have been surprised and astonished at the fullness of the reports of the Memphis papers of the proceedings of our Association. It is seldom, if ever, a convention of this character is reported so carefully and completely as they have done it here. I think we will all go away from Memphis in a spirit that will bring us back

if we ever have the slightest excuse. I move the adoption of the resolutions.

Carried by a rising vote.

The Chairman—Next on the programme is

THE QUESTION BOX.

Secretary Randall—The first question is as follows: "What is the cause of brick being solidier in the kiln right above the arches than in the middle of the benches?" This is a question that a gentleman has taken the pains to send here to me in a letter. He said he regretted very much he couldn't come in person.

Mr. Crafts—I should answer it, so far as my experience goes, by saying they are not.

Mr. Hale—I should say that a man didn't have them burnt, that's just the trouble.

Mr. Randall—The second query is: "Can any member give information on the subject of burning brick with coal gas?" I think, perhaps, Mr. President, I can give the gentleman who asked that question the information he desires. I'm going to adopt the method of Mr. Elsom. If the gentleman will address me I can give him the name of a firm that is using coal gas. I think it's the Grapejuice something Company. I don't remember the exact address, but if the gentleman will write to me I'll give him the name of the company. That is all the questions in the box, and, so far as I know, there is no further routine business. I have received since coming to Memphis, several letters from members scattered around generally through the country. They are all of one purport, regretting exceedingly that they couldn't come. Some expected to come up to the last moment. I don't suppose it is necessary to read the letters.

Mr. Crafts—I should like to say, as Mr. Pike said at the opening, if we have any spare time, I should like to hear from the brickmakers—hear their experience in regard to the cost of burning their brick and what they use for burning them. That is really one of the most vital questions to be determined.

Mr. Randall—As a member of the executive committee, I know there's one question that is going to require a good deal of hard thinking, and that is in regard to our next place of meeting, and I wish every member here would stop and think a moment. They've talked about going East and going West. Kansas City is the only place that has extended an invitation; several members have spoken about going to Philadelphia. I'd like to ask those members present who are in favor of going to Philadelphia, to signify their desire by holding up their hands.

Twenty-four held up their hands.

Mr. Randall—All those in favor of going to Kansas City—there's another point to that: it is from the West and the central states that we have received our largest representation. One thing we hope to do by going East is to instill a little life into those Eastern men. They seem to have the idea this is a Western enterprise, and don't feel much interested.

Mr. Ittner, of Omaha—Kansas City has sent an invitation.

Mr. Crafts—I'm in favor of Philadelphia because I imagine there's large numbers of brickmakers who have grave doubts in their heads that there is such an Association as this and think that if there is it isn't any account.

Mr. Purington—They are a good deal like an old brickmaker in Chicago. I tried to get him to attend this convention, and offered to pay his expenses if he would come down here. He said "I can't learn anything myself or teach anybody else."

Mr. Crafts—Last year was the first time we got any member from the East; and this year they came again. When you go East you'll get more members, and when you go West again they'll follow you.

Mr. McCain—In Washington, D. C., next September, the conclave of the Knight Templars of the Masonic Order of the United States meets there. Some of the delegates to that convention are brickmakers from various portions of the United States; at all events, a good many will go there, anyhow, and if this convention should meet in Philadelphia, or any other Eastern city, probably some of the members would be killing two birds with one stone. I would suggest that Mr. Randall leave the matter to the executive committee with the expression he's already received. I regret that we haven't got a single member from the city of Philadelphia participating with us at this session of the convention.

Mr. Blaffer—I'd like to add that tonight I believe will be the last time we'll all be here and I've taken the liberty to arrange with the steward for a big long table that we all might take a final supper together—this whole Association; and we'll have that supper, say, at half-past seven o'clock, and if there's any sentiments to express on that occasion we can do it and let every man speak what he has to say and bid a final adieu.

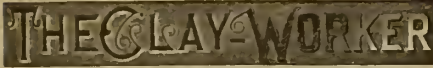
Mr. Purington—I want to extend an invitation to the local brickmakers of Memphis to take supper with us.

Mr. Randall—And I want to include in that invitation the members of the press. I think it's now high time to adjourn, at least a motion to that effect will be in order.

On motion, the convention adjourned *sine die*.

PORTSMOUTH FIRE BRICK WORKS.

An illustrated number of the Portsmouth (O.) Blade has a large cut of the above works. The officers of the company are: President, W. Q. Adams; Vice-President, Reuben Jenkins; Secretary, Leslie C. Turley. The original plant, established in 1881, had a capacity of 8,000 brick per day; increased in 1886 to 16,000, and has been increased lately until their daily output is 28,000 per day, with a pay roll of \$1,200 per week. This plant has been in full operation for seven years, with but two or three stops of only two or three weeks duration, which speaks favorably for the quality of goods turned out.



INDIANAPOLIS, IND., JAN., 1889.

Entered at the Post-Office at Indianapolis, Indiana, as second-class matter.

Terms of Subscription.

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Ten copies, " "	8 00

Subscribers when ordering a change of address should give both the old and the new address.

ADVERTISING RATES FURNISHED ON APPLICATION.

Correspondence on all subjects of interest to Clay Workers is solicited. Communications from practical men will always be welcome. Address all communications to

T. A. RANDALL & CO.,

25 Thorpe Block, Indianapolis.

THE CLAY-WORKER FOR 1889.

With this number of the CLAY-WORKER we commence Vol. XI. We are particularly gratified with the fact that the new year opens auspiciously in many respects. The general trade outlook was never better. From all parts of the country the word comes to us that extensive preparations are being made to build the coming season.

The great clay working industries of the country are fully alive. Large plants are being put in at important points for the manufacture of brick of all kinds, terra cotta, etc. The use of brick for road and street making is exciting a great deal of attention. The work of paving streets and highways with brick is well begun in several states, and the results are so satisfactory after eight, ten and fifteen years' use that too much can hardly be said in commendation of this method of permanently improving streets and highways. THE CLAY-WORKER has done what it could to educate in this direction. In every advance movement in clay working our columns have been open to aid in spreading broadcast every practical suggestion or thought that might serve to quicken the public heart beat.

We have in the past endeavored to furnish our readers with the experience and thought of leading men on all questions relating to clay working. In addition our illustrations have been suggestive and educative. In the future as in the past we shall not count the cost of keeping to the front.

In entering upon the eleventh volume our facilities are better than at

any time since the initial number came from the press, and we will enlarge our facilities as the needs may indicate, to meet promptly and fully every demand of the clay working craft.

We have the pleasure of saying that at no period in the publication of the CLAY-WORKER have we had such an accession of subscriptions from all parts of the country. We expected much but we have happily received more—*much more*. Our advertising patronage speaks for itself.

All in all we have every reason to be proud of the work already accomplished and to anticipate still greater success and prosperity. Our watchword is *progress* and we shall strive earnestly to serve and advance the best interests of the craft that its brightest prospects may be fully realized.

HOOSIER LUCK.

Indianapolis can surely count itself among the luckiest and most prosperous cities in the Union. We now are enjoying natural gas; one of nature's rarest blessings. Every one is proud of "Little Ben," our new President whose splendid abilities will bring added honors that must reflect credit upon us all. Commercially we are taking long strides. Our industrial interests are prospering in a greater degree than ever before and whatever may have been the sentiment in earlier times it is now a fortunate thing to be a Hoosier and particularly a Capital Hoosier.

Our local brickmakers are confidently anticipating a boom the coming season. Already contracts are being made for early spring delivery and the indications are that more building will be done in 1889 than in any former year.

A CHANGE OF DATE.

The Illinois Tile and Drainage Association adjourned one year ago to meet on the third Tuesday and Wednesday, January 15 and 16, 1889, and the announcement was so made in our last (December) issue. The programme committee has however seen fit to change the time of meeting to Monday and Tuesday, the 21st and 22d, and have sent out programmes to that effect since the December Clay Worker went to press.

We are informed that the date was changed on account of other meetings that would occupy the available room in the State House. It would have been better, we think, had the time adjourned to been observed even though

the convention had to meet in some hall in the city instead of in the State House. It seems to us that the interests involved are too important to be thus compelled to take a back seat to make room and place for any and all other organizations.

Confusion of dates is always disastrous to these meetings and if the "powers that be" find it necessary to alter the date of meeting they should at least notify the press in time to permit of proper notice.

Our readers will note that the convention will meet Monday and Tuesday, 21st and 22d, in the State House at Springfield.

OPEN TOP KILNS.

The proper management of open top kilns especially in burning drain tile is discussed in a practical manner in the January number of the Drainage Journal as follows:

"While it is true that open top kilns are not generally in good favor among our leading tile manufacturers, it is also true that there are quite a number of them in use. They are not the best kilns, but they serve a good purpose oftentimes, where the burner knows how to burn in them. Indeed we know some who burn excellent tile in open top kilns. The suggestions that we make have a practical side in our judgment that will apply to other kilns in some respects. They are briefly as follows: Set the tile a little open in the corners and at points where the difficulty of getting a draft of heat is experienced. Make the openings over the heat flues larger at such points so as to allow the heat a freer passage, and closer at the points where it has been inclined to draw heretofore. In bringing the kiln to a red heat after the watersmoke is off, keep the spots that have been inclined not to burn, well in advance of other portions of the kiln. It is pretty well known to burners, that the hot places tend to get hotter. It will be well to keep the side arches where the tile have not burned well heretofore, in advance in the heating to watersmoke. The general firing of the kiln after the red heat point has been reached should look sharply to the points suggested. Where there is a tendency in one portion of the kiln to fall behind, the burner may increase the heat in the better fuel used or by using a fuel that will send a flame up through the ware, and thus increase the draft of heat at the point desired. After a high heat has been reached in the kiln, except at such points as are inclined to lag, it is the practice of

some, in the use of open top kilns, to open the platting in the center of the cooler spots, and set three or four large tile on top of each other, setting them in the opening in the platting. The tile serve as a flue to increase the draft and draw the heat through the cold spots. Others cover the hot spots of the kiln tight, and in this way drive the heat where it is wanted, which may be done by covering with sheet iron, and afterwards throwing three or four inches of dirt on the iron. By tight platting in the way suggested the heat can be taken to the sides, or to the center, or to the center and sides, as may be desired.

"Again we call attention to the heat flues. They may not be large enough or open enough on top, or too open; also the setting of the ware of any kind, will have much to do with the result in burning. The burner should be a man of good practical horse sense, quick to observe what is going on, and always ready to apply the necessary means 'to get there' as the boys say. 'Talent' may know why this and that should be done, but it is 'tact' that knows how, seizes the opportunity and does it. The 'tact' men are in demand for burners. They make all kinds of kilns go."

TRADE PUBLICATIONS.

The Gurney Brick Machine Works, T. C. Gurney, proprietor, Milwaukee, Wis., send us their Catalogue for 1889. It is a neat 28-page pamphlet. Send for a copy.

The New York Belting and Packing Co., New York, have just issued a new pocket Catalogue of their well-known Vulcanized Rubber specialties, which will be cheerfully forwarded to those making application for same. It is very neat and handsomely gotten up, with illuminated cover printed in six colors.

The Lidgerwood Manufacturing Co., 96 Liberty Street, New York, have just issued their new Catalogue for 1889. It is a beauty, and a credit to this enterprising concern. The book contains fully a hundred excellently executed engravings of their superior Hoisting Machinery, Boilers, Etc., and will be forwarded to those making application.

The Henry Martin Brick Machine Mfg. Co., of Lancaster, Pa., favor us with one of their Illustrated Catalogues for 1889. From the title page, which is very neat and tasteful, to the last page it is filled with cuts and descriptions of and testimonials for the well-

known Martin Machines, which, they claim, embody all the latest improvements in soft mud machinery. A copy will be sent to any of our readers on application.

We have received a handsome Catalogue from Jonathan Creagers' Sons, of Cincinnati, O., containing illustrations and descriptions of the Grand Automatic Brick Machine and other clay working machinery manufactured by them including a full line of brick yard supplies. The catalogue embodies some novel features that will amuse as well as enlighten the craft. They desire every brickmaker in the land to write for a copy mentioning the Clay-Worker.

A WORD TO SUBSCRIBERS.

We are indeed gratified by the promptness of a vast number of our subscribers in remitting for 1889. We also heartily appreciate the many kind words and good wishes that have come with the dollars. However there are many yet to hear from and to them we address this request: In remitting if you send private check please add 20 cents to cover cost of collection. We think it a good plan to send check as that is in itself a receipt, but please don't forget to add the 20 cents.

EDITORIAL NOTES.

Mr. C. S. Cowles informs us that there are large beds of fine clay near Wilkesboro, N. C., and as there will soon be one and perhaps two railroads there, making it an excellent opening for a brick and tile plant.

The Indianapolis Pottery Co. are prospering. Their business for the past season was very satisfactory, anticipating a still larger demand for their ware the coming season, they will improve their plant and increase their capacity.

Demand for brick throughout the South has been quiet for the past two months, but brick manufacturers are preparing for an extensive trade in the early spring and summer. There will be large quantities of brick used in all the Southern cities for sewer purposes as well as buildings. Knoxville, Tenn., alone, it is estimated, will use twenty-five million bricks this year.

We are frequently asked if we know of some good, practical man wanting a situation, or if we know of an opening for such a man and whenever we can do so we take pleasure in giving the desired information. However, to all

who are seeking situations or to those who want experienced help we commend our "Wanted" column as the surest means of securing what is desired and our readers will do well to look to it as an easy and economical means of supplying their wants.

As we go to press (January 18th) the weather is as mild and warm as a spring morning. The winter is half gone and we have had but one snow sufficient to cover the ground, and it remained with us but a few hours. In most part the days have been bright and cheery with night freezes—delightful weather. Building has progressed much the same as at other seasons of the year, foundations laid and walls erected as if the frost king no longer held sway.

The Hillsdale Fire Brick & Tile Co., Hillsdale, Ind., are making an excellent fire brick. They consider themselves especially fortunate in the character of their clay. Mr. W. L. Raynes, of that firm, made a brief call a few days since, he had a sample of the clay and a sample brick, which they make on an Invincible Brick Machine made by the Eagle Machine Works Co., of Indianapolis. The brick burn a cream white and so far as tested have stood the severest test. They have also an inexhaustible bed of red clay suitable for pressed brick and terracotta. They will also manufacture fire proofing, as soon as the machinery can be placed in position and necessary kilns erected.

A CHEERFUL LAY BY A SWEET SINGER.

Editor Clay-Worker:

Enclosed herewith please find one dollar to renew my subscription to the Clay-Worker for another year.

I cannot allow this opportunity to pass without congratulating you upon the ability you display in writing your articles. It is easily seen by practical men that you are men who have yourselves had experience in the working of clay into brick and tile. Your Clay-Worker must be of great value to all manufacturers of brick. I for one read with a great deal of pleasure each number as soon as it comes.

I have been in the business for over thirty years and have a yard now making seven millions a year, yet I find some very useful and profitable information in your paper.

Wishing you the compliments of the season I am, Respectfully Yours,

THOS. NIGHTINGALE.

Toronto, Canada.

NEW ADVERTISEMENTS.

Fletcher & Thomas,
Brick Yard Supplies.
St. Louis Iron Works,
Dry Press Brick Machine.
Jonathan Creagers' Sons,
Brick Machinery.
Anderson Foundry & Machine Works,
Chief Brick Machine.
F. Huetteman & Co.,
Brick Machine.
Grand Automatic Br'k Mach. Mfg. Co.,
Clay Working Machinery.
Benj. Craycroft,
Eagle Brick Machine.
National Brick & Truck Co.,
Barrows and Trucks.
Eagle Machine Works Co.,
Invincible Brick Machine.
I. & M. Wolf & Coleman,
Iron Clad Dryers.
H. O. Whitney,
Andrus Brick Press.
Small Ad's, For Sales, Wanted, Etc.

EDITORIAL NOTES and CLIPPINGS.

Epping, N. H., is to have a pottery.
A brick yard will be started at London, Tenn.
Stuart Bruce will build brick works at Bonifay, Fla.
Large brick works are being built at Inglewood, Cal.
The Trion (Ga.) Manufacturing Co. will start a brick yard.
Chas. Frost & Co. will build a brick plant at Marble Falls, Tex.
Geo. W. Shaffer will start a steam brick yard at Spencerville, O.
Sims & Barnett intend to enlarge their plant at Washington, Ga.
W. A. Squires is preparing to start a brick yard at Henrietta, Texas.
Lewis Jones' Pottery at Pittsboro, Pa., was burned recently. Loss \$10,000.
Henry Smith & Co., Horseheads, N. Y., intends to build an artificial dryer.
Sam'l Gibson & Co's brick dryers were burned recently, cause—natural gas.
The Ouchita Coal Co., of Camden, Ark., will establish brick and tile works.
Read the "For Sale, Wanted, Etc.," columns. You may find something you want.
Brannan's Pottery, at East Oakland, Cal., was partially destroyed by fire January 1st.
The Meyenberg Brick Co., of Chicago, have made an assignment. Liabilities, \$40,000.
James Sandison, of Morberly, Mo., in renewing his subscription says:

"Don't stop my Clay-Worker, I can't do without it. I have bought all my machinery from ad's in it."

The Rochester (Pa.) Pottery Co., want a clay knife for trimming ware when it is green.

Wm. Alsip & Son, formerly of Chicago, are now operating a brick yard at Watertown, Dak.

W. M. Neal and others have organized a brick company and will build a plant at Helena, Ark.

The Brady's Run Fire Clay Co., of West Bridgewater, Pa., has been chartered. Capital \$40,000.

W. C. Green Brick Co. are putting in Morrison Kilns on their large brick works at Wichita, Kan.

A. N. Forsyth, Greenfield, Ind., will build a brick yard and may make roofing tile and paving blocks.

Hall & Barr, of Cedartown, Ga., will put in a brick plant and be ready to manufacture brick in the early spring.

The Brockway Brick Co., of Fishkill, N. Y., has been incorporated. Capital, \$100,000. Edwin Brockway, President.

While drilling an artesian well at Yankton, Dak., a vein of potters' clay was penetrated to a depth of 150 feet.

The Ohio workhouse board at Toledo have ordered the purchase of a brick machine having a capacity of 20,000 a day.

Salmen Bros., of Slidell, La., want to put in artificial dryers this winter and will increase their output this coming season.

Benj. P. Morrison, Abingdon, Va., wants information on the manufacture of clay tobacco pipes, especially the making of moulds, etc.

A new firm which will give its attention to the manufacture of building and ornamental brick has been organized in Fort Dodge, Ia.

N. J. Cruger, of Albany, Ga., is putting in Morrison Kilns and hot floor dryers this winter and preparing for a large trade next spring.

The Barrington (R. I.) Brick Co., has been organized with capital of \$150,000. They will erect a modern plant of 100,000 a day capacity.

A. J. Hamil will organize a company to manufacture brick and tile near Americus, Ga. He may also want to purchase sewer pipe machinery.

The Pontiac Brick & Tile Co., of Seattle, W. T., has been incorporated by M. J. Carkeek. J. A. Harrington and Chas. J. Fox, Jr. Capital stock, \$12,000.

C. Hawks, a St. Paul, Minn., banker, has purchased the brick yards at River Falls, Wis., and will run them night and day making 50,000 brick every 24 hours.

Mason City (Iowa) is thought to offer exceptional advantages for the establishment of a large brick plant. They have an almost unlimited amount of fine clay.

The Austin (Minn.) Pressed Brick Co., will put in a new 100-horse-power engine and other machinery. They expect to commence making brick again March 1st.

The Brown & Harrop Mfg. Co., of Portland, Ind., are having an excellent trade in Brick and Tile Machinery. They recently shipped two outfits to parties in Canada.

The Tennessee Brick & Mfg. Co., of Memphis, Tenn., will add a line of soft mud machinery to their plant the coming season and will be pleased to receive catalogues of improved machines.

Kelly Bros., of New Orleans, La., (47 Carondelet St.) are thinking of engaging in the manufacture of roofing tile and desire to communicate with parties who can furnish machinery for that purpose.

Chambers Bros. Co., of Philadelphia, call especial attention to their Iron Dry Cars and Iron Pallets of which they manufacture several styles suitable for all the different artificial brick and tile dryers.

A. J. Boyce's Pottery Machine Works, East Liverpool, O., was totally destroyed by fire Jan. 3d. Loss, \$20,000; insurance, \$14,000. This is the second time this works has been burned out within a few years.

The Abendroth & Root Manufacturing Co., 28 Cliff St., New York City, makers of the popular Root Sectional Safety Boiler has been obliged to enlarge its plant at Green Point, L. I., to meet the demand for its specialty.

Milton F. Williams & Co., of St. Louis, Mo., are manufacturing a patent clutch pulley that is proving very popular wherever introduced. They (the manufacturers) have received a great many flattering testimonials from those using them.

The National Terra Cotta and Brick Co., of Bethell, Kan., has been incorporated. Capital stock, \$250,000. Directors: W. P. Carter and Holger Ohmeyer, of Bethell; C. A. Merrill, of Kansas City, Kan.; W. P. Longworthy, of Kansas City, Mo.

The Knoxville (Tenn.) Brick Co., are now turning out 50,000 brick a day at their works at Powell's Station. They have an abundance of excellent clay and contemplate the addition of sewer pipe and fire brick works to their already extensive plant.

On page 63 we introduce to the trade the Lyons Brick Press. The high praise given the Lyons' Machine by those who have used it during the past year or two entitle it to considerate attention from those contemplating the purchase of dry press machinery.

The Steubenville (Ohio) Pottery Co. has decided to build an addition of three kilns to its present plant and to erect a new Pottery adjoining. The cost of the improvements will aggregate \$50,000 and will give employment to about 100 additional hands. The new Pottery will make C. C. ware.

The Eureka Brick Machine Co., of St. Louis, Mo., have removed their offices to the Laclede Building, that city, and will be pleased to have visiting brickmakers look in upon them. We may say, by the way, that the Laclede is one of the finest and most elegantly finished Office Building in the U. S.

Henry Ritter, of Burlington, Iowa, in renewing his subscription, adds: "We made over two millions of brick last year all the old way—by hand. Would put in machinery if we felt certain that we could work it satisfactorily and to an advantage over the old way. We dry by the pallet system and on the open yard and burn with wood."

We recently had the pleasure of witnessing the operation of the Boyd Brick Press in the shops of the manufacturers, Messrs. Chisholm, Boyd & White, of Chicago, and was very favorably impressed with the appearance of the machine and the ease with which it turned out an excellent quality of brick. Two fine engravings of this machine is shown on pages 8 and 9.

A new Automatic Dump Car which possesses unusual merit recently invented by Mr. C. W. Raymond, of Dayton, O., will be ready for the market the coming season. Contractors and brick manufacturers contemplating the use of such an article will find it to their advantage to investigate the points of this car. Those in use have surprised their owners by their rapidity of work and general convenience.

Salmen Bros., of Slidell, La., have just burned a Morrison Kiln of four hundred thousand capacity which they built last fall. This kiln is thirty feet in width, but by a recent improvement of Mr. Morrison's his kilns can be burned any width desired. Mr. Salmen says this kiln burned as uniformly as the other, which was but twenty-five feet wide. Brickmakers will be pleased to learn that the difficulty of burning wide kilns with furnace attachments has been solved.

Messrs. C. W. Raymond & Co., of Dayton, O., are making a special study of the matter of ornamental brick work, designing of new ornamental patterns or manufacturing those submitted by architects. The manufacture of ornamental brick work and terra cotta which has received a new impetus by the advent of the Perfection Brick Press is now assuming large proportions, several large companies having placed their orders with Mess. C. W. Raymond & Co., for outfits for spring delivery. Their catalogue of 100 designs will soon be issued.

"THE CHIEF."

The record of this successful machine is indeed an enviable one. It is now well-known throughout the United States. The "Chief" invaded nearly every state in the Union last year the sales exceeding any previous season. The prospects now are bright for a still greater success during 1889. Special attention is requested to the following as a specimen of the many testimonials of good work done by the "Chief":

OMAHA, NEB., Dec. 26, 1888.

Anderson Foundry & Machine Works,
Anderson, Indiana:

Gentlemen:—Your favor of the 19th inst. at hand. Will say in reply that we purchased our first machine of you in 1886; in '87 one, and in '88 three. We now have five of your "Chief" machines. The first one purchased gave such good satisfaction that since then twenty-two more have been sold in this city. The quality of the brick is good, with sharp edges and full corners. We have no trouble in making 30,000 brick per day on each machine. In durability it is unexcelled by any other machine used in the city. We use no crusher, no pug mill and no soak pits; we work the clay direct from the bank, and soak it as it goes into the machine, which thoroughly grinds and mixes it. We use stiffer clay than can possibly be worked by hand. We are well satisfied with the "Chief" and can heartily recommend it.

Yours respectfully,

MICKEL, RILEY & CO.

MENTION THE CLAY-WORKER

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NOW (before January 1st) is the time to send, together with this advertisement, \$4 for 1889, and secure

all that is offered above, including **FOUR EXTRA COLORED STUDIES**, "Quiet Coast Scene," "Little Rosebud (Child)," "Ferns," "Birds of Paradise," making

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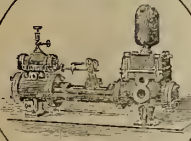
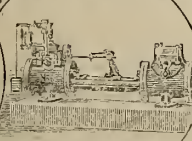
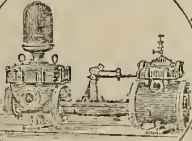
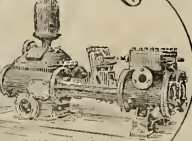
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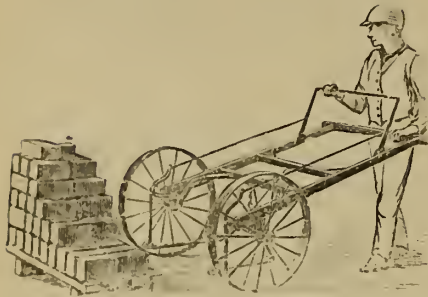
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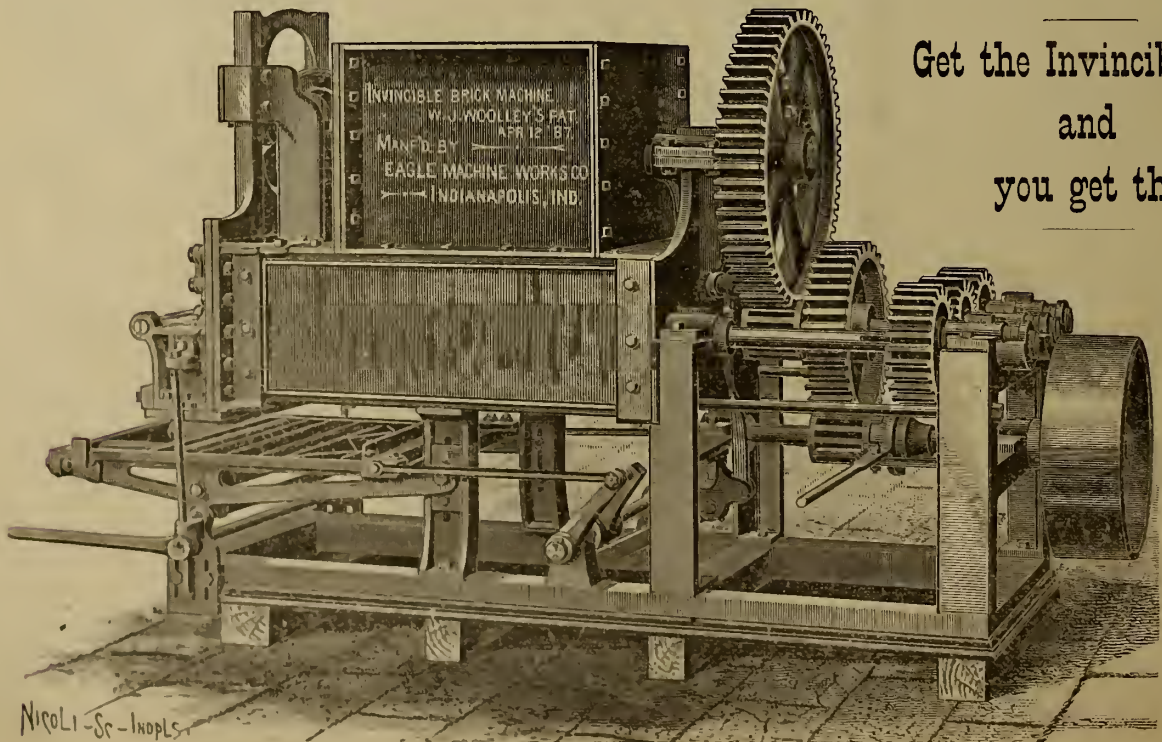
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THE CLAY-WORKER

VOL. XI.

INDIANAPOLIS, IND., FEBRUARY, 1889.

No. 2.

Written for the Clay-Worker.

EXAMPLES OF AMERICAN BRICK AND TERRA COTTA WORK.

No. 13.

THE ROOKERY.

This building is among the most notable of Chicago's great commercial structures none of which are more deserving of attention from clay-workers.

It is one of the largest and finest office buildings in America and is located at the corner of Adams and La Salle streets.

The "Rookery," so called from the old city buildings which formerly occupied the site, was erected in 1886 by the Central Safety and Deposit Company, of Chicago, under the supervision of the architects, Mess. Root & Burnham, of that city.

The ground covered is 167 feet 6 inches on Adams street by 177 feet 8 inches on La Salle street. It is eleven stories high, and 160 feet to the top of the cornice. Structurally, the exterior is granite for the first two stories, and red-dish brown brick and terra cotta above. The main terra cotta work consists of carved panels on the continuous bay windows on both fronts. The general type of ornament is borrowed from East Indian forms without literally following any one example. The piers throughout are rounded from top to bottom, and all of the arches and lintels are formed upon the same radius, brick of special pattern being made for the purpose. Wherever terra cotta is

employed it is designed in small blocks, which are bonded in with the brick-work. The constructional part of the building is thoroughly incombustible, all iron work performing any constructional purpose being covered with fire-proof material, and the floors laid on hollow tile, as usual in large office buildings. Any iron mullions in windows or elsewhere about the building

glazed enameled brick, with glazed terra cotta ornamentation. All the wrought iron work in the court is finished by the Bower bath process in gold bronze. The lower portion of the court is roofed over five feet below the second story windows, the space thus enclosed being finished in white marble and plate glass. In the general finish great stress is placed upon the detail and size of the entrances and vestibules. These are finished in polished white marble and onyx. A grand staircase leads to the court gallery, this being finished in the same material.

ORDINARY bricks are about eight inches in length, and with the mortar joint about half that in width, so that each brick on the flat will give a horizontal surface of about thirty-two square inches, or $4\frac{1}{2}$ bricks will cover a square foot. As ordinarily laid there are nine courses to every twenty-four inches, or $4\frac{1}{2}$ to the foot. Four and a half courses with $4\frac{1}{2}$ bricks to the course gives 20 $\frac{1}{2}$ bricks to the cubic foot. Waste, cutting and closer joints will easily require an allowance of twenty-

one bricks per cubic foot, which will be found a very convenient figure for estimating the number of bricks required for a wall of a given size and thickness, and it thus becomes unnecessary to find the cubic contents of the wall, but merely to multiply its face area or the product of its length and height in feet by seven-fourths of its thickness in inches, which, as the



THE "ROOKERY" BUILDING.

which are exposed serves no constructional purpose. The principal feature of the interior plan is a central court, in which the utmost care is taken to make the most finished effect, as well as produce the greatest possible amount of light. This court is open from the top and is about 75 feet square, with offices facing all around. The walls of the court are English cream-colored

thickness is always some multiple of four inches, is a very simple process.

Written for the Clay-Worker.

HINTS ON BRICKMAKING.

No. 33.

BY "R. BRICK."

A friend once asked me what trade I was learning and I said, "Brickmaking." He replied, "Why, I didn't know there was any trade about that business. I thought any person could make bricks." This is a popular fallacy, nevertheless it is this mistaken idea among the uninitiated that is one of the chief causes of low prices of brick; also an explanation of why so many bricks, or things called bricks, are put on the market, and when laid in a wall make a thoroughbred brickmaker blush for his calling. Just for the reason that people imagine that a brick yard can be run like turning a crank.

Some enterprising but misguided citizen that can get a blind horse, an upright box with a wooden shaft set on end in the middle, with wooden pins driven into it, a distorted tree hung sort of horizontally across the top of this wooden shaft, with a single-tree hung on the end of the said distorted tree, which is then called a "sweep;" to this is attached the blind horse referred to above. Some "loam" is brought to this "masheen," as "any person can make a brick," "any kind of dirt will make a brick," the loam is thrown into the concern, the blind horse which cannot discern is led around a few times until he can see the way and go it alone. As the loam passes down through the wooden pins it is agitated pretty thoroughly by the time it issues from the bottom of the "masheen;" somebody is there ready to seize it and plunge it into a mould, another chap bears it away in triumph, turns the mould bottom side up and shakes the thing out upon the earth. It is now an *alleged* brick, and another and another is laid beside it until there is a row across the yard. Then we behold a brick yard in full blast.

The blinded horse goes round
Till the mass of clay be ground,
And no weary arm is folded
Till the task of bricks be moulded.

The new fledged proprietor views the thing with much satisfaction and says to the spectators, "I told you any one could make bricks,"—poor fellow. These bricks when dried are piled up in a pile called a kiln, a skin of unburned bricks is wrapped around them, fire is placed under the kiln, and all the wood on hand is shoved into the

thing, then the rails from adjacent fences follow, to get up an extra heat to make them "cherry red." The N. F. B. M. informs the burner that all the wood, as well as available rails are burned, hence it is his opinion that the bricks must be burned "cherry red," in fact they looked "cherry red" on top the previous night. The arches are "daubed" up for the last time and the work is finished. The next morning a red hot brick is taken from the top of the kiln, it is thrown to the ground and quickly covered with sand, and left there several *minutes* until cool. It emerges from the sand bath looking quite blue and as full of checks as a baggage room. It is pronounced first rate, kiln burned "cherry red" to the plating, (this he has learned from some sure enough brickmaker). When the kiln is opened the bricks are all a beautiful yellow in color.

There is just one good point about this burn, and one so much sought after by all of us, it is uniform in color—all yellow; uniform in hardness—all soft. Our N. F. B. M. concludes it is not exactly red "cherry red" but rather a yellow "cherry red," and he gathers together more wood and fires again, determined to make it hard this time. The result is, the arches are all melted or broken, still a large crop of yellow "cherry red" and a few thousand sure-enough "cherry red" in the center. He has now spent considerable money and must realize on these bricks; they will not bring the regular market price, he offers them at a reduction.

Here the "Comedy of Errors" makes itself felt among the brickmakers, for people think one brick is as good as another, for if anybody can make brick it follows that they will think that anybody's brick are as good "as any other body's."

We are perhaps partially to blame for this state of affairs. Many of us are careless as to the quality of the bricks we produce, careless as to their handling before and after they are burned. We should prepare the clay better, see that the bricks are perfect in shape and well-burned, giving them strength and beautiful color, so that when they are properly laid in the wall the structure will be "a thing of beauty and a joy forever."

The contrast between these bricks and those made by the amateur "dirt dauber" will be so marked that even the "street gammons" will take up the subject and discuss it.

Let us make bricks so attractive that the public will conclude that it takes a brickmaker who has spent years of

time and labor, observation and thought, to manufacture a brick that is a brick.

The annual coming together of progressive brickmakers at the National Brick Manufacturers' Convention will do more to bring about the desired result than can anything else. Once a year at least we are proud that we are brickmakers, and why should we not be proud? The very bricks we are manufacturing will be utilized by the human race through all time to come. They are as durable as the granite hills of New England.

Written for the Clay-Worker.

POTTERY.

The worker in clay was the historian of the ancient world, as well as a contributor to the greatest share of its domestic comfort. The first rude utensil, after the flint arrow or spear point, was the primitive pot of baked clay, that enabled pre-historic man to prepare the fruit of the chase or field. Its use, in higher or lower stages of development, has been universal, from the African negro and American Indian to the ware of Sevres or Japan.

The higher civilizations have grown, the more extensive and various has



FIGURE 1.

the art progressed. Indeed, our improvements have come more through our extensive knowledge of chemistry, the improvement of the glaze, and the expansion of the list of fire colors, than through an improvement in model or plastic decoration, in which the ancients displayed a perfection that has left for us little beyond imitation.

The same is true of architectural decorations and of art objects; and if we consider the antiquity of Chinese or Japanese art—an art that is modern only in the sense that the races who practice it escaped the wrecks of the ancient world, but where art itself

is of unknown antiquity—we may safely answer that beyond merely mechanical improvement of methods and cheapening of products, we have yet much to learn from the past.

The Chaldeans and Egyptians were the most ancient whose records in clay

arate and distinct from religious or warlike instinct. It is to this fact that their inspirations and conceptions held a relation to the great truths of human nature so strong that no mere art can break away from them; and hence our conception, lacking in passion, is only mechanical reproduction of forms, or slaves adherence to their conceptions. Their religious instincts conceived their idols in forms of ravishing beauty, and the artistic expression resulted in an art equally beautiful, free and natural. We are following in their footsteps, because we have not improved upon their moral ethics, and because the ancient artist, in following a natural instinct had unconsciously drawn from the great fountain of truth.

I have emphasized these points because a more thorough study of the ancient standards is necessary for the general improvement of our own, and to assist in awakening a more general interest in the work men have already

accomplished.

The illustrations presented in this issue are all specimens from the ruins of Troy. They represent a depraved

Minerva, drawn with the same brutalized conception of the attribute of wisdom to be expected from a people who still immolated children on the altar as a religious sacrifice.

It will be seen by anyone who will recall the majestic Minerva of Phidias, how wide is the gap between the civilization of the Trojan era and age of Greek culture. A vase of the age of Pericles and the one represented in Figure 3 shows the development of the human kind in the most indelible characters, and discloses a gap made greater in so far as development is

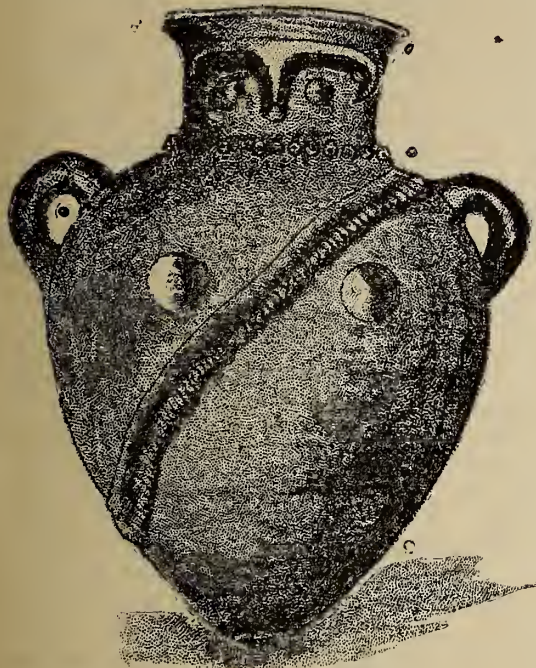


FIGURE 2.

have come down to us. The latter developed the highest and most beautiful forms of domestic ware and articles of *vertu*, while the former developed its architectural capacities to a degree where we are just now imitating with such happy effects. This divergence in development by two ingenious races was probably due to variations in the conditions imposed by the materials each found most ready at hand. The Egyptian genius did not seek architectural expression in terra cotta, owing to the abundance of excellent stone. The Chaldeans, on the other hand, depending upon the clay deposits of the Mesopotamian plains, were compelled to extend its use to the utmost; and with this material they embellished their edifices with a gorgeous diversity of form and color that we are now only beginning to appreciate and utilize.

Further in the course of these papers we will present many illustrations and models drawn from these sources, to evidence the truth of these assertions. But at present we will confine our remarks to domestic utensils and art subjects.

The latter were almost universally religious in character. In those days there was no such thing as art, as we now understand it, as a sentiment sep-

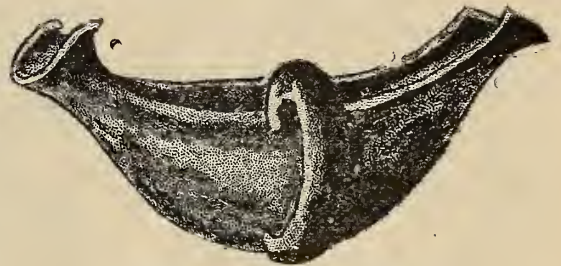


FIGURE 4.

concerned, than that which separates us from Alexander the Great. In fact, the only departure during this great interval was developed by the gloomy Ecclesiasticism of the middle ages—a period, however grotesque its conception may have been, certainly impressed the strong individuality that always follows the passionate enthusiasm that is the basis of all real expression in art forms. Its decadence was due to the fact that it portrayed the life of demons and angels, instead of human nature common to men in all ages.

A BLOW AT THE TRUSTS.

The legal mind of America has perhaps been devoted to no line of study more closely in the last few months than to discover some way of checking the rapidly growing power of trusts. Judge Barrett, of the Supreme Court of New York, has made a great step in solving this difficulty by one single decision. It is understood that trusts have no legal status; that is, have no responsibility to the state, and cannot sue or be sued. Corporations merged into these vast organizations virtually drift away from the basis of their formation, and, in turn, manage to evade much of their legal responsibility. The learned Judge decides on this ground that a corporation, the standing of which was in question in a case before him, had forfeited its charter, and gave an additional reason that the profits of the trust combination were not distribut-

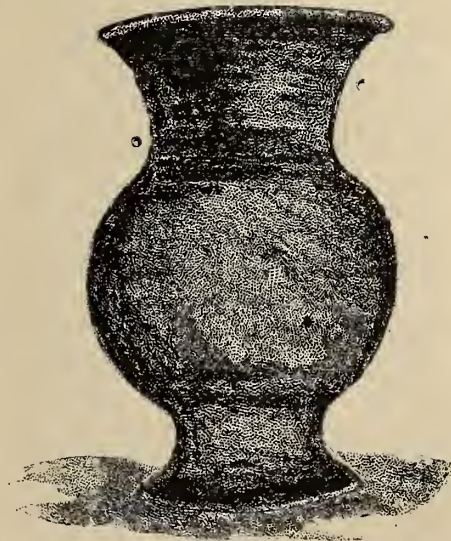


FIGURE 3.

phase of Egyptian art, as translated through Phœnician source. While the execution is rough, as would be expected from mere novices the suggestions of form are artistic and show the impress of their Egyptian origin. Figure 2 is a vase with the owl-headed

ed, on anything like the basis of the capital stock of the corporations of which it is formed. If the opinion of Judge Barrett in this matter will hold, a strong and most effective weapon for fighting the trusts has been placed in the hands of the American people. If corporations are to lose their existence and franchises immediately on becoming connected with trusts, the days of the trust iniquity would be numbered—a consummation most devoutly to be wished.—*Ex.*

Written for the Clay Worker.

THE MANUFACTURE OF TOBACCO CLAY PIPES.

BY CHARLES T. DAVIS.

Very few know that nine-tenths of all the clay pipes manufactured in the United States are made in Brooklyn and yet such is the fact. Over 15,000 gross of clay pipes are annually produced by the three factories located in that city, which together employ thirty hands or an average of ten each. A visit was made to the largest of these factories, which is situated on Kosciusko street, near Broadway, and which is run on the co-operative system, being the result of a combination of several small manufacturers, who found that the profit on the goods was too small to allow of much competition. Probably less than one person in a thousand know how the clay pipe is made.

The clay used in the manufacture of the common pipe is obtained from Woodbridge, N. J., and costs at the pit \$2 per ton. With freight and cartage added, the raw material costs delivered at the factory \$5 per ton. The clay obtained at Woodbridge is said to be superior for pipemaking to that obtained in Dorsetshire and Devenshire, in England, as it is more absorbent, and therefore more healthy to the smoker. A fine bed of clay is also worked to some extent at Glen Cove, L. I. The clay, after being delivered at the factory, is allowed to stand in the sun for a few days to become seasoned. After thus being exposed sufficiently long it is mixed with water and "milled," the process consisting of running it through a mill which crushes it and removes all grit and foreign substances. After coming from the mill it is worked and kneaded by hand, much in the same manner as bread, and whatever grit remains is carefully removed. Great care is taken to have the clay of the same consistency throughout as otherwise the pipes would crack and become spoiled under

the test of the kiln. When the clay has been worked sufficiently it is given to the "Roller," as the man who fashions it is called. His tools are the simplest, a wooden bench, a stool, a rolling-board, and his hands constituting his "kit."

The clay is placed on the right hand of the bench, in easy reaching distance of the workman, and then the second process of pipemaking is gone through. Grasping a handful of clay the workman separates it in halves and placing them on the board rolls them, one with each hand, until they have reached the length desired one end, of which the bowl is made, resembling a small sized pear. When it is remembered that only about one ounce of extra clay is allowed for each dozen pipes rolled, it will be seen how difficult it is to grasp just the exact amount necessary for each pipe from the pile of clay without calling into requisition the aid of scales. After being rolled the partly formed pipe is laid on a board just the length of the pipe desired, when if the stem is too long it is broken off at the required length.

After one dozen pipes have been rolled in this fashion, they are bunched and passed over to the helper, who sits on the opposite side of the bench, on one end of which is the machine with which the pipe is made. It consists of a lever, at the lower end of which is a plunger, the size of the bowl of the pipe to be made. Below the plunger is a slot in which the iron mold is placed; the slot allowing the mold to enter until the bowl of the pipe is directly underneath the plunger. When the half made pipes are handed to the man at the machine, he picks up the bunch in one hand dipping the other in oil with which he oils the clay, separating the bunch as he does so. After oiling the clay he picks up the iron pipe mold, which is double, separating at the center, and opening it he dips his finger in oil and with a quick movement oils the mold, which from constant use shines like burnished steel. The mold is the exact size and shape of the pipe. After the mold is oiled the workman picks up a long steel wire, and, oiling it, proceeds to insert it in the stem of the pipe, pulling the clay on in about the same manner as a glove is put on the hand. After the wire has been inserted nearly to the bowl portion of the pipe, the clay is placed in the mold, which is then closed and placed in the slot of the machine, care being taken that the wire in the stem does not reach to the

bowl, as, if it did, the plunger which forms the bowl would break it. The mold is pushed as far as possible into the slot of the machine, care being taken that the wire in the stem does not reach the bowl, as, if it did, the plunger that forms the bowl would break it. The mold is pushed as far as possible into the slot, and while being held there with one hand the workman turns a screw at the side of the machine, with the other hand forcing an iron plate against the mold, the pressure forcing out all superfluous clay and forming the pipe. The lever to which is attached is then lowered, the plunger entering the bowl portion of the mold forcing out the clay and making the bowl. The mold is then withdrawn from the machine, the wire in the stem being forced into the bowl of the pipe making the hole through which the smoke is drawn. The clay which has been forced out of the mold is then cut away with a knife and the pipe removed from the mold and placed upon a tray. In some of the machines used, a knife is attached to the lever, the superfluous clay being cut from the mold as it is removed from the machine. It is an American invention, but owing to the fact that it does not always work smoothly it is only used upon the more common pipes. The wooden trays when full are placed in the sun to allow the clay to dry moderately. They are then taken by a girl and each pipe is carefully polished with a piece of hard wood. A "rimmer," a block of hard wood is placed in the bowl and turned round to smooth the bowl, while a piece of iron attached to the "rimmer" cuts the wreath on the outside of the bowl. The stamp that is seen on the front side of the bowl is then put on by means of a hand stamp, and the pipe is ready for the "potter," another girl who places the pipes, bowls down, into an earthen pot called "saggers," which after being filled with pipes, is covered with a flat earthen cover and placed in the kiln. The clay before being fired is of a slaty blue. The various decorations, such as wreaths, fern leaves, figures, etc., seen on the pipes are formed by the mold. After the kiln has been filled with "sagger," containing the pipes the door is closed and the fire built. The fuel used is charcoal and coke, and the fire is kept at a white heat for twenty hours, the heat entering the kiln by means of flues. Great care is taken not to allow the flames to reach the white clay pipes as the slightest touch of fire would blacken them. After

remaining in the kiln the required time the pipes, which by that time have become perfectly white and hard, are removed and allowed to cool, and are then carefully examined and placed in boxes and barrels ready for shipment. The clay pipes, the pipes of which are colored in imitation of smoked meerschaum are made in the same manner excepting that the fire is allowed to reach them in the kiln—the color being obtained from it. The white clay pipes which look like new meerschaum are made so by being varnished.

The factory visited makes about fifty different styles of pipes at present, and can make as many as the ingenuity of man can suggest by means of molds. One style of pipe was of red clay obtained from Maryland in the form of a head and that head representing the famous Brooklyn divine, Rev. Dr. Talmage. The mouth is used for the bowl of the pipe, the neck being utilized for the stem. The demand for this style of pipe was very large for a time, but none are manufactured now. Various other curious styles were seen, one a bust of Garfield, which proved a total failure on the market.

A Farmer's Comparative Gain From Using Tile.

BY D. O. LOY, MONTICELLO, ILL.

I was walking one day with Farmer Jones, Over a section of land he owns, It was in the fall, as I remember, About the first of last September.

His harvest was over and threshing was done, And plowing for wheat had just begun, The furrows were all as straight as a line, And I noticed the ground broke mellow and fine.

While crossing over a stubble field, Mr. Jones was boasting about his yield, Of wheat and oats of barley and rye, On land that never before was dry.

"Three-fourths of this section was nothing but slough, Which never got dry enough for to plough, While the rest of my land was tougher than wax, And the whole farm, sir, wouldn't sell for the tax.

"I could raise some corn, when we had dry years, But I always raised more nubbins than ears; Then I tried sowing a few acres of rye,— But, sir, it didn't grow more than knee high.

"There was no use trying, I couldn't raise wheat, So the whole blessed year I had corn bread to eat;

I made my garden where it seemed to be rich, But my 'taters' and onions would rot in the ditch.

"I tried raising stock—some cattle and hogs, But they'd sink out of sight in my sloughs and my bogs; Besides, raising hogs was no profit to me, For they'd get sick and die with the hog cholere.

"Then Maria and the children took down with the chills, And I spent all my money for quinine and pills; About that time, sir, I felt mighty blue, For Maria did washing to help me pull through.

"My health had been good for in fact as a rule, I had a constitution as tough as a mule, But, sir, you can see I had reason to kick, For such luck as I had would make a mule sick.

"At last my old bones began for to ache, And, sir, my whole carcass would shiver and shake, Then I took the fever and was confined in bed, And I wished the whole family of Jones' was dead.

"To pay off my mortgage I knew I must fail, So my section of land was put up for sale. But no one at the sale would make the first bid, For the whole of the farm under the water was hid.

"And the mortgagee even a deed wouldn't take, For he said he could never make use of a lake, He released the whole mortgage and gave it to me, Saying, 'Swim to your shanty your title is free.'

"I'll pledge you my word, before tiling was laid, On the whole section, sir, not a dollar was made; The low ground was too wet, or the high ground too dry, And I always had feed for my horses to buy.

"Until old neighbor Clark decided to tile, With his outlet through my land for over a mile, So I tried planting crops on each side of the drain, And I found I could raise just a plenty of grain.

"Then I commenced tiling, at first rather slow, For my income was all from the crops I could grow; Until now, sir, my farm has a plenty of drains, And I just sit in the house and laugh when it rains.

"And now this whole section of land is my own, I am all out of debt and have money to loan; That I raise splendid crops, sir, no one can deny, Though the weather be wet or the weather be dry.

"Just look at my horses, hogs, cattle and sheep, All feeding on clover that's more than knee deep, Take a glance, if you please, at that herd of swine, Did you ever see hogs more healthy than mine? "Climb over the fence and examine my corn, Did you ever see bigger ears since you were born?

And look at the pumpkins all over the ground, And squashes, sir, that you can't reach around.

"Now we'll go to my granary and examine my wheat, Which grew on this stubble right under my feet,

And this very field, sir, I would have you to know, Was a deep, muddy frog pond where nothing would grow.

"Just two years ago I could get in a boat, And all over this fine stubble field I could float,

But now you can see the result of tile drains, And readily count my comparative gains.

"And now in my garden, sir, everything grows, Till they crowd each other clean out of the rows, Just pull up a potatoe vine, sir, if you will, And count the potatoes that grow in a hill.

"I've tiled every pond, and I've tiled every slough, And I have tiled every foot of my high ground too; I don't care a cent for the money it takes, Since our whole family are cured of the shakes.

"No family on earth now has better health, And it is plain to be seen I am gaining in wealth; My children, sir, they just 'do it up' brown, For they go with the tony young people in town.

"By using drain tile I am free to acknowledge, I am sending my boys and my girls off to college; And Maria, she's visiting friends in New York— I am the wealthiest farmer that lives on Lake Fork."

But, said I, Mr. Jones, some people deny, That tiling's a benefit when it is dry: I have heard that a man who lives in Champaign, Said, if we didn't stop tiling it never would rain.

"Yes, I heard that too," the farmer replied, "But I knew for certain the fellow had lied, For notwithstanding what he said in that card, All last spring and summer it rained just as hard."

"It surprised me to see from a man of his rank, A letter that seemed to be written by a crank, But we'll not hear again from a pen or a mouth, That drain tile have anything to do with a drouth."

"For," said Mr. Jones, "you plainly can see, What use of drain tile has accomplished for me, During seasons of drouth and seasons of rain, One hundred per cent. is my comparative gain."

TAKING NO CHANCES.—Groom—(to bride; they are waiting for a minister) —Hadn't I better skip out and see what is the matter, my dear? The ministers should have been here twenty minutes ago." Bride—"No, George; you stay right where you are,"—Harper's Bazar,

Written for the Clay-Worker.

AFTER ALL BRICK IS THE BEST.

BY J. F. ELSOM.

Since my return from Memphis where all was of the brick brickey, I have had sundry physical examinations to make of material designed to supercede brick in the construction of buildings, one of the very latest candidates for architectural favor being blocks in the form of bricks, made from the refuse or offal from blast furnaces, in other words "slag," but more of this anon when the tests have progressed sufficiently for one to base an opinion. Again, the services of this laboratory have been brought into requisition for deciding the relative values of brick as compared to iron, steel, and stone as fire-proofs, particularly for ornamental fronts, pillars and palisades. One in particular is the case of a frightful accident resulting in two deaths and an alarming loss of good property in a collapse occurring a couple of years ago. I have yet to see, and I have been in constant practice nearly twenty years, any material that, all things considered, will withstand the onslaught of extensive fires equal to good brick, the experience in Chicago and Boston proves this conclusively, and notwithstanding the fact that iron, steel, granite, etc., presents a much greater crushing strength than our ordinary brick, it has been shown during great fires that two buildings in every way equal so far as exposure to the heat was concerned, one constructed entirely of brick, the other with iron posts, pillars and window casings the former will stand until completely gutted by the fire before the walls will totter and fall, in many instances not falling at all even after the interior is burned away, while the latter will often fall before the flames have reached it, the iron bending, twisting and otherwise distorting sufficient to allow the superincumbent mass to fall for lack of support by the heat generated by the fire of an adjoining building, and if of granite or stone chipping and cracking until like causes produce like disastrous results.

I have been told by old and experienced firemen that during the progress of extensive fires it was always safe to allow the men to work around brick buildings presupposing them to have been well made of good brick—as long as they could for the heat but with buildings wherein iron and steel entered largely into the construction especially as supports even approaching a burning building was always

accompanied with danger from the building collapsing.

Insurance companies also recognize the reasonableness of the theory and efficiency of these conclusions. As a rule their rates are lower on solid brick than mixed structures, and accident companies draw deep dark lines between the two when they write policies covering each loss separately, and insurance experts have long since decided that a building constructed largely or even entirely of iron is not necessarily fire-proof.

Iron, when heated, bends very readily, when under very light pressure, and cannot be considered of itself fire-proof. I am forced to admit as the results of experience there is very much to be said in favor of iron as a building material. It prevents fire from spreading and unless there is a large amount of inflammable material in reach of the flames, there is little danger of the fire itself making much direct headway amidst a mass of iron, but I am not speaking of direct burning but the results of the burning of other substances sufficiently near to heat the iron.

Returning to granite and other varieties of stone, any of them is little if any superior to iron as preventing these indirect results of fire, hence, for these reasons alone brick stands at the head as a building material. What though brick itself presents a comparatively low crushing strength as compared to iron, steel, etc., a very silly argument presented in their favor. But does not every single brick in a properly constructed wall bear its own weight? And to make them doubly, aye, triple strong in this respect, are not the joints broken in every conceivable manner as the walls are built.

Brick has passed through many fiery ordeals and stood apparently unharmed, long after iron, steel, and the hardest rock have succumbed, burying almost countless millions in its debris which with brick could have been largely saved. Cast iron is not homogeneous enough, is not solid enough, wrought iron though an improvement is but little better. For a strictly fire-proof building, in purpose as well as intent, there is not a material known in chemistry that stands ahead of well made brick.

Small Clerk—"Fader, a shentleman in de store wants to know if dot all-wool, non-shrinkable shirt vill shrink?"

Proprietor—"Does it fid him?"

"No, id is too big."

"Yah, id will shrink."

CORRESPONDENCE.

THESE COLUMNS ARE OPEN TO ALL. THE FULL NAME AND ADDRESS IS REQUIRED BUT WILL NOT BE PUBLISHED EXCEPT WHEN PERMISSION IS GIVEN BY CORRESPONDENT. THOSE DESIRING TO COMMUNICATE PRIVATELY WITH ANY CORRESPONDENT WHOSE FULL NAME IS NOT GIVEN CAN DO SO BY ADDRESSING LETTERS CARE OF CLAY-WORKER.

A Ramble Round Kansas City Brick Works.

Editor Clay-Worker:

According to promise I send you a few notes of what I saw among the clay workers of this city. Dry press process takes the lead. The most noted works are those of the Calorific Brick Co. They operate two very large and powerful hydraulic presses, which make a first-class brick, but the high price of this machine puts it beyond the reach of any common man. Each machine presses ten brick at a time and makes 40,000 per day. They are taken direct to the kiln and set 40 high and burnt in Wingard kilns. Their works are in the city and as their clay was running short they purchased a tract of land about ten miles out, where they have sheds for housing clay in large quantities. It is plowed, rolled, winrowed, and then taken into the sheds by scrapers and teams where it lays fully four weeks before being shipped to the works for manufacture.

Close to the above yard is that of Messrs. Underwood, who use two "Lion" presses for their dry process, and a Martin machine for soft mud brick, which are dried on pallets on racks. The two presses turn out about 20,000 each and the Martin about 30,000. They burn in permanent clamps with grate bars of about 8 feet in length to each side, set 40 high of which the top five or six courses are mud brick, and as the latter takes much less fire than the dry press brick, they consequently get very uniform burns.

Further on I visited the yard of Messrs. Norcross Bros., the contractors, who are engaged on an immense eleven-story building for the New York Life Insurance Co. They use a Chambers and also a Little Wonder which are both turning out good stiff mud brick, and burn in a Morrison open kiln, and also in a Radford Continuous kiln. I am pleased to say this is the second continuous kiln that I have seen working successfully in the United States.

There are several other yards near those already mentioned which are principally making by hand, and which I had not time to inspect, but it is only a question of a short time now when the old hand yards will have to move out of the city limits as

the clay is being worked out and the land is too valuable for building purposes.

Across the Kaw or Kansas river I came to Wyandotte, now called Kansas City, Kansas, which is connected to its sister city by numerous fine bridges, for wagon, cable and railroad, including the Elevated and also the Wyandotte & Northwestern Railroad. The latter is yet in its infancy, but the business already being done through the large and populous country will insure its soon becoming one of the first railroads of the state. This railroad runs through a tract of land abounding in large quantities of clay which underlies the top surface to a depth of 50 feet, and which is suitable for almost any class of clay manufacture.

The first place I visited on this road was the works of the Gregg Brick Manufacturing Co., a mention of which appeared in your last issue. They have just lately started grading and laying in foundations for machinery and kilns. Two of Gregg's celebrated machines have just arrived and will be put in place in a few days and they expect to have brick on the market in a short time now.

Next along the railroad I came to the works of the Whittaker Brick Co., This company has been running about twelve months. They operate three of Whittaker's Semi-dry machines. Their clay is of a very fine texture. It is easily dried, and after being turned over with a cultivator it is brought into large dry shed for use as required. The clay taken from the shed is first run through a Williams & Co.'s "Cyclone" Pulverizer, which reduces it to a very fine powder. From here it is taken up by an elevator and dropped into a revolving screen, which separates any lumps or foreign matter which may have gone through the pulverizer. From the screen it drops into a mixer, which carries it to the chutes which feed the brick machines, which make it up into a perfectly square and true brick ready to set direct into the kiln. This company have lately built a continuous kiln from the plans of R. R. Gray's patent, and which at the time I saw it was turning out good hard brick. They also have two large open clamps. A mile further on is the station of Bethel, where a brick and terra cotta works has lately been established, but which at the time of my visit had only burnt two or three kilns by way of seeing what their clay would produce. This company pro-

pose building large works for the manufacture of architectural terra cotta, and is, I believe, an offshoot of the Northwestern Terra Cotta Co., of Chicago. This completed my ramble, with which I was very much pleased altogether.

A. R. BATLEY.

A Letter from England.

Editor Clay-Worker:

We are making brick on the semi-dry plan. Our clay is a shale, and we call it "knots." It grinds easily in a perforated bottom pan and makes direct into bricks, without any drying, mixture, etc. The bricks are set at once in the Hoffman kiln, i.e., directly they leave the machine. Within ten minutes the knots are in a natural state in the pit, ground in a pan, made into bricks, pressed and set in Hoffman kiln ready for steaming and burning. Our bricks for labor, engine power and coal, cost about 7 shillings (\$1.67) per 1,000, i.e., bricks (after burning) $9\frac{1}{4} \times 4\frac{1}{2} \times 2\frac{3}{4}$. This does not include rent rates, wear and tear, supervision, clerks, etc., but simply all labor in the yards and coals for kilns and engine. There are ten yards here, and if we are all in full work could turn out 250,000 bricks a day.

The bulk of the bricks go to London by railway. We had a very wet season in England during the past year. The brickmakers in Kent, Essex and elsewhere, who make plastic bricks for the London market, have been stopped over and over again by the weather, and their output reduced many millions, while we who make semi-dry bricks and can make in all weather, have not had as good a season for several years past. At this time of the year we generally have between us some ten millions of brick in stock to supply the spring demand, while now we hardly have any and our demand exceeding all we can make. Several of us had heaps of second bricks in stock, which under ordinary circumstances were in a great measure unsalable, but all of these are now gone, the builders have cleared us out of good and bad alike. As a matter of fact, speaking broadly, there are no bricks at the present moment unused in England. Of course you could find a million or two here and there, but in comparison with other years there are practically none in stock. We have raised our prices two or three times within the past few months, but still the demand exceeds the manufacture. We used to make plastic bricks very

extensively, but semi-dry is fast taking the place of plastics. The reason is—semi-dry can be made so exceedingly cheap, and there is no loss by exposure to weather.

R. S. BLINK.

Petersborough, England, }
January 4th, 1889.

Wants to Know How to Burn With Gas.

Editor Clay-Worker:

I have been noticing the Clay Worker to hear some one say something about the use of natural gas in the burning of brick, but I believe I have failed to hear the subject mentioned. I had expected to hear it discussed at Memphis last month, but nothing was said. I would like to have some one who has been using it say something through your journal as to its success or failure. We have the largest gas field in the United States at Noblesville, Ind. Gatts & Nelson, who have been using it in temporary walls, have not been successful. It is the cheapest fuel in the world; gas may be had at from 10 to 15 cents per 1,000.

JOHN LAWSON.

Burning Glazed Ware.

Editor Clay-Worker:

"F. F. C.," of Harrisburg, Pa., complains in the November Clay-Worker that his ware is smoked in cooling off. Probably a kiln of stone ware can be smoked in cooling off, even if the burning has been faultless, but if it is smoked in burning it cannot be cleared up in cooling off. Bright trial pieces are not an infallible indication that the ware is the same. We have seen clay smoked somewhat similar to his in Southwest Missouri. The clay previously in use burned nice and bright without any difficulty, but wishing to change to a new bank a small quantity was used in the old clay as handles, and it burned still brighter. Next a few butter pots were made of it and the burned to a lighter color than the remainder of the kiln. This was considered such a satisfactory test that the next time the kiln was filled with it. The trial pieces continued to indicate that the color was all right, but when the kiln was opened—lo, and behold! it was "black as your hat." Here was a mystery for solution. The clay was superior in every way except that it burned to a dirty brown color, and on some pieces a thin film of something—clay, salt-glaze or ashes—raised up rough and wrinkled about one-sixteenth of an

inch from the solid body of the clay. All efforts to improve the color in cooling proved fruitless.

Finally, an accident happened which threw light on the difficult question. When the kiln was nearly done an arch came down in the doorway (up-draft kiln), and with it a stand of small ware. As soon as the door was opened to put in a fire, the rough scum immediately appeared. Here, then, was a solution to the mystery—too much cold air. By shutting off all draughts of cold air through the fire-hole this clay burned to a good color when the crown-holes were sufficiently open at the same time to give a good draught. Therefore, if the ware is smoked by cold air in cooling off, we would suggest that he keep the grates covered with the remains of the fire, the doors closed and the damper up. Let the kiln cool in this way to a light cherry red, and then close up as usual.

In nine cases out of ten the fault is in the burning. It has been my experience, and I think the majority of burners will agree that any condition or circumstance which has a tendency to produce a smothered fire will almost invariably give a dark color to the clay. Extended experience, observation and experiment with different varieties of clay has established the fact that the smothered flame of imperfect combustion not only gives the clay a dark smoky color at a high temperature, but the inside glaze is dim and the ware if it does not crack has a strong tendency to do so. On the contrary, a good clear heat is obtained by using the least quantity of fuel and allowing the greatest amount of air to enter the kiln at the same time. Every pound of wood or coal requires more than ten pounds of air (151 cubic feet) to burn it completely. A kiln burning ten tons of coal in fifty hours, having a round chimney two feet in diameter, would require a draught through it something like 28 miles per hour. Complete combustion, however, cannot be obtained in an ordinary furnace; but it is a curious fact that the nearer we approximate to it the better the burn will be. I think this is true of all clay ware, for a few very bad kilns will nearly ruin the kiln bottom. Any amount of charcoal or coke, whether burning or deprived of air, will not injure the ware; it is the gaseous constituents of the fuel which produces the mischief.

When a shovelfull of coal is thrown on to the fire, about 30 per cent. is driven off as gas in a very short time, and the question arises how can the greatest portion of it be consumed? To some it might seem that nothing like a smothered atmosphere could be produced while plenty of cold air is allowed to enter the fire-hole above the coals. But the disengagement of gas is fitful, being greatest at the time the fresh coal is put on, and does not correspond to the uniform supply of air furnished by the draft. Three necessary conditions cannot be fulfilled: 1st, sufficient air; 2d, an intimate mixture of gas and air; 3d, a high temperature of the mixture ranging between 552° and 790°.

Flame is only burning gas, and if it comes in contact with a cold body or a cold current of air the greater portion of it is put out—a part of the flame extinguished, or in fact does not take fire at all. We cannot see this but we can see the effects of it—smoke. The unconsumed gases are carried up by the draught into the midst of the ware where a high temperature prevails. Here, then, is the “dead heat” or smothered atmosphere. The gas can be more completely burned, and a lively clear heat obtained as follows: Keep the grates covered; in firing, push the coals back, and put the fresh charge at the extreme front end of the grates—don't throw it back under any circumstances; don't stir the fire; shut off the draught of cold air above the fire with tight doors until the fire-holes become full up to the arch over the grates—in front only—after which the doors may be left open.

Now, instead of the fresh coal being surrounded on all sides with fire a portion of it is heated on one side only, consequently the gas will be driven off more slowly and uniformly: it is intimately mixed with a greater proportion of air and passes on through a bed of red-hot coals.

Now, considering the immense volume of air required for complete combustion it is evident that the damper must be raised gradually to the highest notch. The heat will be more uniform from top to bottom if no cold air can enter anywhere below. A very intense clear heat will be produced, considerable saving of fuel, and the ware will be burnt to a uniform light color with a brilliant slip glaze. With wood, make very small fires nearest the door.

C. T. Saxe.

Lyons, N. Y.

Among the Brickmakers.

Editor Clay-Worker:

Among the many strange things in the brickmaking business its that the Western man goes East and the Eastern man goes West for new discoveries and improved methods. So I have just been West to learn something about brickmaking.

I first stopped at Galesburg, Ill. Galesburg is becoming renowned as a paving brick center. I found there a very fine clay, as good as I have ever seen for paving brick. They have two large yards, being run to their full capacity, and are not keeping up with their orders. The Galesburg brick are being shipped a long distance—to Burlington, Ia., Quincy, Ills., Atchison, Kas., and many other places. I must say that these bricks are not as smooth as I would like to see, but it is claimed that that is no detriment to paving brick. They are using the Acme machine, manufactured at Bucyrus, Ohio, and the Penfield, made at Willoughby, Ohio. Both yards are using the Eudaly down-draft kilns. The Galesburg clay is very difficult to handle, being what is known as blue shale. This clay is almost always found over the coal measures in the West, and so far nothing has been found equal to the dry-pan to reduce it fine enough to make a good brick. The clay shrinks considerably in burning.

I next stopped at Burlington, Iowa, and I must say that here I was disappointed. Burlington has not a single first-class brickyard. I learned while there that a new company—the Burlington Brick Co.—is putting up a large plant. They had just arranged to put in the Eudaly kilns, but had not settled the machine question. They have a similar clay to that at Galesburg, and will use the dry pan for crushing. There is a large contract for street-paving to be let at Burlington soon. They put in several million last season, and now think that brick well-burned have no equal for paving purposes. If I am ever fortunate enough to visit Burlington again, I expect to find a large plant turning out a superior quality of paving and press brick.

At Des Moines, Iowa, I found a large sewer pipe factory turning out paving brick. While the brick were good I must say that I was not pleased with their methods. The plant was made for sewer pipe—not for paving brick, hence their difficulty. If their plant was properly arranged they could, in my opinion, turn out brick much cheaper if not better.

Aside from this plant I found nothing in the way of paving brick. At the Des Moines Brick Company's works (Norman Haskins, President, and J. H. Carruthes, Manager) I found the Andrus Dry-Press Brick Machine turning out splendid brick, but their burning was bad. They have a fine clay and will in time make a fine brick. I was informed while in Des Moines that two new companies had been organized to make paving brick: The Merrill Brick Company, and the Northwestern Brick Company. The former have already burned enough bricks in the common scoved kiln to build a down-draft kiln. The latter company (Mr. E. D. Smith, Manager) will soon put up a large plant after the most improved plans. The clay here is splendid.

I went to Omaha, Nebraska. Here I saw many fine buildings and streets that I almost lost sight of the brick business. However, I found here a great many good yards, making brick by the ordinary methods, such as are in use throughout the country. In Omaha you will find almost all kinds of machines. I found one continuous kiln but it was not running, for which I was sorry. At the Stuart yards I found a dry-press machine making good brick, Mickel & Riley were using the Chief, the Omaha Terra Cotta Co. the Eureka and Penfield, the Nebraska Tile and Pottery Co. were using the Andrus dry-press and the Eudaly down-draft kiln. I here saw a very fine kiln of dry-press brick equal to anything I have seen. They were also building the second Eudaly kiln of a large size.

New Livicy was turning out fine common building brick, hand-made and burned in the Wingard Kiln.

At South Omaha I found the Eureka dry-press, and the foundations for several Eudaly kilns. This company (the Acme Press Brick Co.) has a very fine clay, and will, I am quite certain, make a superior face brick, and will no doubt find a good market for them.

I would like to say something about Omaha as a city, but time and space forbids, suffice it to say that we Eastern people have no conception of the magnificence of Omaha and surrounding country.

My tour of inspection does not end here, but, Mr. Editor, I presume your space is limited, so if you wish I will tell you more of my ramblings in the future.

A STUDENT.

The Cause of Shaky Brick.

Editor Clay Worker:

I have just finished reading the article headed "Shaky Brick," in the December issue of the Clay-Worker, and I think I can answer the question contained therein by giving "A Subscriber" our experience with shaky brick.

In the first place he says he has two feet of black soil on top of six feet of clay, and I presume he uses that with his clay, as he did not state clearly whether he did or did not. If black soil in his case means the same thing as black soil or "Kaley," that is found on top of our clay in Philadelphia, he need go no further for an explanation of his shaky brick, but may commence immediately to dump it to one side as useless, and as the cause of all the trouble. In every case that I know of where this kaley (as it is termed here) has been used with the clay, the brick have turned out shaky, and had a very dirty, streaked appearance in the piles. By this I mean a dirty whitish streak and heads of the brick similar to that observed on the face of some buildings that have been standing for some time. With us it is very important that we get the clay banks clear of all the black soil, and whether it is two inches or two feet it has to come off.

But, granting that this black soil that "A Subscriber" has on his bank is a kind of clay and a fit material for making brick, and that I am wrong in calling it Kaley, then he must look for some other cause for his trouble, and I think he may find it in his four feet of what he terms whitish clay. I know of six banks in our own immediate vicinity that contained more or less of this whitish clay, but none so deep as four feet, and every one of the brick-makers that used it had the same trouble with shaky or brittle brick, as we call them, that "A Subscriber" has. I have noticed the brick after being burned to be apparently strong, but, on striking them together, they would break into two or three pieces, and where the break occurred a smooth glassy surface presented itself, entirely different from the rough irregular edge of a break on a strong brick. This is more noticeable in the brick immediately above the arch on the top hangers, the skintle in the arches, and in fact any place close to the fire where the bricks are crossed and have any considerable weight upon them.

This whitish clay with us, when dry, is brittle and crushes into dust very easily, and has a sandy, gritty feeling

when rubbed between the fingers. When wetted it has the appearance of strong bluish clay, yet the grit of the glass and sand can easily be felt through it. My advice to "A Subscriber" is to make a few bricks from the black soil entirely, and a few from the whitish clay, burn them close to the fire, and I think he will have no difficulty in determining which of the two causes him all his trouble.

F. B. McA.

Philadelphia, Pa.

Cost of Burning Brick.

Editor Clay Worker:

I am one of those unhappy mortals whom you designate as "poor unfortunates, stay-at-homes," etc. I could not get to the convention owing to circumstances over which I had no control, so I had to content myself with reading the very full and interesting report of the proceedings in the Clay-Worker. In looking over the discussion on continuous kilns which followed the paper of Mr. Hoffman on that subject, it occurred to me that brick-makers, who are not acquainted although desirous of becoming so, with the cost and working of this kiln, might form a very erroneous impression from the arguments used, and if you will kindly allow me the space, I will try to put the matter a little more clearly, and give these gentlemen what they want, i.e., more figures and less talk.

First I want to point out how useless it is for a man to tell another, who is burning brick perhaps 500 miles away, that his cost for burning is so many cents per 1000. This does not convey the slightest idea at all, as the circumstances vary so much in different localities. If he would say that he uses so many pounds of coal per 1000 at so much per ton then others can compare notes with him, and if he will add the length of time, including water-smoking, to burn the kiln, what proportion of hard brick, salmon and bats, it will be better still.

In comparing the cost of burning in a continuous kiln it is particularly necessary to look at all the points, or else by taking high prices in one place and low ones in another you may make the open kiln come out the best. For instance, a continuous kiln will burn brick, on an average, for a quarter the amount of money that the open kiln will, allowing the same clay, same make of brick and same locality. Now, suppose a man in, say, Ohio is using open kilns, and he gets his lump

coal for \$1.00 per ton, and he uses, say, one-half ton per 1000. This brings his bill for fuel to 50 cents per 1000. Another man in, say, Massachusetts is using a continuous kiln. He would have to pay at least \$5.00 per ton for lump coal there, or \$4.00 per ton for coal dust. The long haul makes coal dear there, and of course the freight on the dust is the same as on the lump. If he used one-fourth ton of dust (and he would not use more) his burning would cost \$1.00 per 1000. According to these figures the continuous kiln is costing more than the open one, but to make a fair comparison let the latter be placed beside the former in Massachusetts. The open kiln would then require one-half ton at \$5.00 per ton, which would be \$2.50 per 1000 as compared with \$1.00 per 1000 in the continuous kiln. Or, bring the latter to Ohio; wherever lump coal can be bought for \$1.00 per ton they are glad to get rid of coal dust; any way it could be bought for 30 cents per ton, and at the rate of one-fourth ton per 1000, the cost in the continuous kiln would be $7\frac{1}{2}$ cents as compared with 50 cents in the open kiln as above.

Again, to compare the two kilns in a yard with which I am acquainted in Kansas, making dry-press brick: The average cost for labor in burning an open kiln is about 45 cents per 1000, which allows one burner and two helpers by day and same at night for 12 arches. Wood is \$3.00 per cord and lump coal \$3.50 per ton. Two cords of wood per arch of 20,000 brick are used for water-smoking, and one-half ton of coal for burning. This gives: For labor 45 cents, wood 30 cents, coal \$1.75; total \$2.50 for 1000 for labor and fuel in burning. A continuous kiln on the same yard holds 300,000 brick, and is burnt round in 15 days costing one man at night and one in daytime for labor and three car loads of coal dust—that is 60 tons at \$2.50 per ton, which gives for labor, two men at \$2.00 for 15 days, \$60.00; for coal, 60 tons dust at \$2.25, \$135.00; total, \$195.00 for 300,000 brick, or 65 cents per 1000 for fuel and labor, as compared with \$2.50 in the former case.

A good deal has been said about loading bricks from these kilns. Bricks are either sent away by railroad or wagon. If the former, they have to be wheeled away by barrows into the car in most cases, and it costs no more to wheel them from a continuous kiln than an open one; and if the latter, then the doorways in the continuous kiln can be built large enough for the

wagons to be backed into the chambers and the loading then will cost no more in one kiln than another.

R. R. GRAY.

A Pilgrim's Views and Observations.

Editor Clay-Worker:

I have completed my tour of almost eight months amongst the mighty men of bricks and machinery, and feel but one disappointment with the result, and that was my inability to attend the convention held at Memphis.

I have performed a pilgrimage, as it were, in search of the shrines, whereat could be found, good locations, and clay, fire brick, progressive men, new and improved machinery of all kinds for brick and tile, especially new machinery for moulding brick by the dry or semi-dry process, to investigate kilns, particularly the new down-draft claimants for public favor, to study the petroleum fuel and gas fuel problem, to investigate fire-proofing by the porous terra cotta lumber process, to form acquaintance in the business amongst its best men, and by observation, to profit by other people's experience.

My journey has been to me a gratifying success, and I have not only obtained the knowledge sought, but I have also been treated with kindness and courtesy wherever I visited although it was quite evident that I carried a large sized augur with me to "bore" for "pay dirt," and how each individual or firm converted it into good brick.

CHICAGO.

Here, I found a fruitful field for investigation for here was to be found not only good brick from this vicinity but from all quarters of this country.

The Hydraulic Pressed Brick Co., of St. Louis, seems to have a mighty grip on public favor and their choicest productions are found on every hand, in the grandest of buildings, and their trade growing.

Toledo, Milwaukee, Tiffin, Zanesville, Philadelphia, Baltimore and other cities send here their best wares and yet with great home talent to supply the demand, "free trade" in brick piles up large fortunes for individuals and companies.

The Anderson Co. and the Tiffany Press Brick Co. show in extensive lines and varied shapes, very fine productions, the former a new pinkish gray brick set in novel and beautiful designs for six stories, above a ground story of massive Egyptian style in a harmonizing tint of stone.

Oh, yes! I found progress in men

and methods there, and a great striving for new and better productions.

Petroleum fuel seems to be, for old-fashioned and up-draft kilns, a success. Certainly it is so in the handling of it by Purington, Kimbell Co. Mr. D. V. Purington afforded me every facility at his yards to note all the technical details of its application and operation at a kiln of 840,000 brick. There were twenty-four openings each side, and the forty-eight fire-ways were as completely under instant specific control, as if there was but one opening. Mr. Purington's experience in burning 30,000,000 brick, proves it to be a gratifying success as to cost, care and trouble, and makes it almost the ideal fuel. The company use the "Rhoads" Burner.

One of the wonders of Chicago, in fact of the United States, is the fire-proofing of the auditorium building by the Illinois Terra Cotta Lumber Co. With this porous material they have lined and partitioned the inside, laid the floors and ceilings, covered every pillar, girder, and brace, round, square, or any other shape, and thus have made iron at last fire-proof with clay. Their works adjoin the city at Kensington, on Lake Calumet, from which they excavate their clay, which is ground up with coarse sawdust in proper quantities until plastic, and then it is molded into "lumber" by two Penfield and two Clark machines. Mr. A. W. Beidler, Superintendent, and Mr. C. H. Bebb, Constructing Engineer, gave me every facility to study their processes and the application of the material, which is looming up as one of vast interest to brick-makers all over the country.

For ventilation and dryness it is today the best of all earth materials for inside walls and partitions.

The Pullman Brick Co. are using petroleum fuel for their mud and plastic made brick with much success.

As in other places, I found some individuals working some wonderful methods of making and burning wonderful brick, but in profound secrecy, so secret in fact, that I could not find even a building made from them on which to ravish my longing eyes, but they generally had "the only" presses, "the only" kilns, and "the only" oil burner, but yet none of their bricks drop off of fourteen story buildings on to the doubters.

Chisholm, Boyd & White, of that city, had just completed a new "dry press," that a careful inspection of convinces me, will be a strong candi-

date for public favor. It is the "New Boyd." Of very compact, sightly, and powerful construction, with a medium speed and novel application of pressure, yet with three molds it gives a good day's output.

At Chenoa, Castle & Pike appeared to have a good down-draft round kiln for coal and wood (and needing little of either to burn it) that for pipe and tile, works just right. Specimen bricks burned in their "New Discovery" Kiln, were very fine for hardness and color. They use the New Departure Pipe and Tile Press, of the Anderson Foundry and Machine Co., with great success.

At Anderson, Ind., I found the Anderson Foundry & Machine Co. doing a fine business with their twin pets, the Chief Brick Machine and the New Departure Tile and Pipe Press. The Chief I found at work in the yard of Jones & Clemens, near town, and when it comes to a mud or semi-stiff clay machine here is the very "chief." It is built all of iron and steel, harmonious in adjustment and movement, easy and simple to handle, turns out good, well-tempered brick, and a large day's work. Their New Departure Pipe and Tile Press I found at work at Summitville, at the factory of Mr. S. C. Cowgill, who declared it to be the only one out of fourteen (I think 14 was the number) he had used, that he had found to be perfect. This gentleman's word is considered law amongst those who know him, and my close examination of the press, and its work, convinced me he was just right. It is a vertical operating machine, but has a horizontal pug mill chamber, and with both vertical and horizontal screws has a very powerful compound action. It is built of iron and steel, and gives a large output of very fine material, also it delivers vertically or horizontally.

At Anderson as well as other places I found brick burning done most beautifully with natural gas.

I stopped over at Columbus to visit the Fish Co., and found them running Whittaker Presses and a 14 chamber Radford Kiln.

My secret declaration that almost any kind of *true clay* can be molded into good brick if *understandingly* handled, is made good in a great measure by the Fish Co., as they are working against a bank vertically composed of eight to ten different colors and kinds of clay, with about 18 inches of semi-stone shale at the bottom, all of which when ground up into a clay hash

comes out a good hard red brick *selah!* However, Fish has good, tenacious hard sense, a good kiln, and a *fine burner*.

At Zanesville I centered all my interest on the Eudaly Down Draft Kiln, one being in the "burn," and two in course of construction, one of which was nearly finished, and the other in that naked skeleton state, in which all its ribs, joints, "inwards," and backbone was delightfully visible, so that the working parts, and the scientific principles underlying its operation were patent to any person of ordinary intelligence.

This was at the yards of T. B. Townsend & Co., and I was placed under many obligations by Mr. Burton, of the company, for not only giving me every facility to study the kiln, but also for valuable information as to costs in detail and for points of interest connected with it, and for a thorough showing up of their plant and processes. Any one wishing to investigate the Eudaly Kiln at their yards will be welcomed.

Their bricks are hand-moulded, also made on a Martin mud machine, and then duly repressed into most beautiful red bricks of plain and fancy shapes.

The company owns and occupies a very unique and handsome building for a town office, and inside it is lined with their own enameled brick, in various colors. The most striking feature in their office is the beautiful hearth and fire place made from black enameled brick. The inside of the office and building is well worthy of illustration in the Clay-Worker.

At Zanesville I found the Zanesville & Oakland Press Brick Co. making the brick "par excellence" of all I have yet seen. They are the crowning glory in red, the ideal in angularity, fine edges and smooth finish, and perfection in grain. The company uses Whittaker Semi-Dry Presses.

In conclusion let me add that all my visits show to me, that the spirit of progress is working in the "craft," the "theorists" have at last got in their "fine work" even among the "doubting Thomases," who find their neighbors passing them by, and who seem to get their discoveries out of the journals and books and things, which is contrary to old foggy ideas and "experience, sir." They at last wake up, and find progress is springing from ideas generously sent broadcast by the men who burn the midnight oil, and write, and "speechify," and rush into conventions, and *exchange ideas*, yea they rush even into printer's ink generally and help,

to spread light on a noble art, and better still in this new era, there is not only honor, but there is also "money in it." DANIEL EDWARD RYAN.

In Favor of the Continuous Gas Kiln.

Editor Clay-Worker:

Kindly allow me space to correct an error in the remarks of Mr. Batley at the convention and reported in the Clay Worker. I see in the course of his remarks that he was once an Englishman; so was I, and I think it is characteristic in Englishmen, as well as other nationalities, to love fair play. Now, I don't call it fair play to injure another fellow laborer by talking about him in his absence, and saying what is not true at that. It shows to my mind either a spirit of carelessness in regard to facts or a lack of good taste.

The error complained of is contained in the remarks of Mr. Batley on continuous kilns. He said of the Guthrie Continuous Kiln, in use by the Columbus (O.) Brick & Terra Cotta Company, that "it was built by an Englishman named Bennett, a man who wasn't altogether square; who represented to that company that he knew how to build the kiln; that he did build it, but couldn't work it, but it was fixed and is now working all right."

Now I happen to be personally acquainted with the builder of that kiln, by name Henry Hibbert, and happen to know the difficulties he had to encounter in the building of it caused by poor material and other sources, and I know that he worked the kiln very successfully against a stiff opposition, and that through internal dissension a professional brick works expert was engaged to satisfy the shareholders on some point, and I also know that he failed to accomplish as much as Hibbins had accomplished.

The fault all through this matter lay in bogus representation of the clay. The Guthrie kiln was erected to burn fine red brick and terra cotta, when in fact there was no material for the work on the company's property. The name of the company combined with the fact that they are now making fire brick exclusively proves this point.

Time came, when through this internal dissension before mentioned, the company decided on a re-organization. About this time, Mr. Hibbert had an offer of another situation, which he accepted, although against the wish of the Columbus Company. After the re-organization—now, here's where Mr. Batley might have been right if he had only taken the trouble

to be correct—a man, whose name I need not mention except that it was not Bennett either, came along and represented to the company that he knew all about the Guthrie kiln. He was engaged at a very small salary, low enough to prove that he knew nothing at all about it. Of course, as is usual with such men, "This was not right," "That would have to be altered," and so on, until he got the kiln thoroughly "muddled;" then, after acting "not altogether square," he skipped. But it was fixed, and is now working all right."

That is not much to say, but it took a lot of getting back to where it is to-day, with the few trifling exceptions consequent to a change of material. This same Mr. Hibbert, last year built a Guthrie kiln for a very extensive firm of press brick manufacturers in Illinois, by which firm I have the honor to be employed. It was this kiln that our friend Mr. Blair described as working successfully, which statement I can endorse. I have in mind a Guthrie kiln erected and worked very successfully by Mr. Hibbert in the north of Ireland.

I have had business relation with Mr. Hibbert for a number of years and know just what I am talking about. Like Mr. Batley I have no axe to grind, but I could not allow so misleading and unfair a statement to pass uncorrected. As for the Guthrie kiln, I believe it to be the kiln par-excellence. It will burn bricks, common and face, tiles and terra cotta, and is one of the most, if not the most, economical kilns in use. As Mr. Blair said: "The fuel does not mix with the brick at all, but is burned in a gas-generating producer, the heated gas that passes through the ware, penetrating to every part alike. I have not room in this, already too long, article, to say more on this (kiln) subject, but will be glad to answer any enquiry from your numerous readers." J. W. CARSON.

Cahoon Co., Ills.

Strength of Brick Work.

Editor Clay-Worker:

In the report of the late convention of the National Brickmakers Convention I noticed [p. 31 of January Clay-Worker] that one of the members was "wonderfully provoked" at the absurd ideas of brick users concerning the crushing strength of brick masonry. Allow me to remark that I am surprised that the "provoked" member did not make his case stronger, as the

facts undoubtedly show he had a right to.

In the discussion above referred to one member said that "a wall two feet thick laid in excellent mortar and ordinary brick, will stand its weight 200 feet high." A second member cited a brick chimney 200 feet high, and a third referred to one 300 feet high. In Glasgow, Scotland, there is a brick chimney 436½ feet high, and another 454 feet high.

I have recently sent to the printer the manuscript for a book—"Treatise on Masonry Construction," to be published soon by John Wiley & Sons, New York City, which contains a large amount of data on the strength of brick and brick masonry, of which I recall the following: By actual experiments in a testing machine the average



strength, from 15 experiments, of piers laid in ordinary brick and common lime mortar, using the same care as that with which ordinary brick masonry is built, stood a few pounds (I am writing from memory) over 1500 pounds per square inch, which is equal to 216,000 pounds per square foot, or the weight of a column of brick 2,000 feet high; with ordinary Portland cement mortar the strength was for a mean of eight experiments, 2,500 and some odd pounds per square inch, which is equal to 360,000 pounds per square foot, or the weight of a column of brick masonry 3,600 feet high. Did any one ever hear of brick masonry being crushed by any load brought upon it in an actual structure?

IRA O. BAKER,
Prof. of Civil Engineering.

University of Illinois,
Champaign, Jan. 23, 1889. }

A BIG THING IN RUBBER BELTS.

We present for the benefit of our readers, an excellent illustration of two enormous vulcanized rubber belts, manufactured by the New York Belting and Packing Co., New York, for parties in West Superior, Wis. Each of these mammoth belts measure nearly half a mile in length, and weigh 11,000 pounds. Had they been made of leather, they would have required at least 500 selected hides to manufacture each one of them. The company have distinguished themselves in the manufacture of large belts. A driving belt fifty-two inches wide, eight-ply, measuring 298 feet long, and weighing 4,000 pounds, was also furnished with the belts illustrated. Recently a belt 2,700 feet long was made for the Pennsylvania Railroad Company, and is

now in use in one of their grain elevators in Jersey City. It is used as a conveyor belt, transferring grain from one end of the building to the other, which is taken off by a simple form of guide arm at any portion of its length, as well as at the end, and conducted into chutes for delivery to vessels at the end of the dock. The belt runs on smaller rollers, and there is a simple form of tightener at the ends, by which it can be readily kept straight and even. In making conveyor belts of this description, the company has long held a leading place, the superiority of such belts in point of economy, as well as of efficiency, has never been equalled. It is of interest to mention that Vulcanized Rubber Belting was first introduced by the New York Belting & Packing Company, and they are now the oldest and largest manufacturers

of Vulcanized Rubber Goods in the United States.

The principal factory of the company is located at Newtown, Conn., and it is the oldest one engaged in the rubber business, although they have another one at Passaic, N. J. The offices, sales-room, and warehouse, are conveniently located at 15 Park Row, New York City, where an almost endless variety of vulcanized rubber goods, including their celebrated packing, hose, mats, and matting can be seen. They also have branch offices in all the principal cities of the Union. Mr. John H. Cheever is the treasurer of the company, and will gladly forward catalogues, circulars, or any other information desired concerning their wares, upon application.

THE ILLINOIS TILE-MAKERS.

The eleventh annual convention of this Association was held at Springfield, Monday and Tuesday, January 21st and 22nd, 1889.

The attendance showed a noticeable falling off compared with former years, due, doubtless, in a large measure, to the change of date which was not known or understood by many, and in part to dull trade which seems to prevail throughout that state.

The reports of members indicate a poor business generally the past year but nearly all seemed confident that there is "a good time coming" and that the prospects are fair for a good trade this year.

The first session was devoted to informal talks on this subject.

Second Session:—Convention called to order by President Pike, at 2:30 P. M. The Secretary and Treasurer made their usual reports, the latter showing a small balance in the treasury.

Mr. Joseph Fifer, the newly elected Governor of the state was introduced to the members and spoke in an informal manner expressing an interest in the work of the convention and pledging his best efforts to advance the cause of land drainage which he regarded as among the most important and necessary means of advancing the agricultural resources of the commonwealth. The Governor by his plain, hearty manner, created a very favorable impression and at the close of his address a recess was taken to enable the members to take him by the hand, which all did heartily.

Mr. D. O. Loy then read a poem on the Benefits of Drainage which proved the hit of the convention. It is given in full on a preceding page.

Mr. G. C. Stoll read a paper on the "Best Methods of Making Tile," which was listened to attentively and the thanks of the Association tendered him. The paper was sharp and to the point and will be given in a future number of this journal.

A practical paper entitled, "How to Avoid Mistakes in Tile Drainage," was read by Prof. E. I. Cantine, of Bloomington, Ill., for which he was tendered a vote of thanks.

The Question Box was then given attention. The query "Which is the best machine for making paving brick," was "given up" as there was a diversity of opinion on the subject.

Mr. Eu laly said he had seen several different machines in successful operation but thought the stiff-mud machines best.

The subject of "Paving Roads and Streets with Brick" was discussed at some length, several members testifying to the durability of brick as a paving material having seen it in actual use for several years with the most satisfactory result.

Third Session:—Called to order by President Pike who introduced Mr. H. S. Barton, of Ottawa, who read a paper on "How to Increase the Demand for Tile," which was written by E. G. Osman, who was not able to attend.

Mr. Leeper explained that he was not a tile maker but a tile user. He is a large farmer and has been underdraining his land for several years and considers tile one of the best possible investments for farmers. Nothing in the way of legitimate investment pays so well he thinks.

The "Prevention of Cracking in Drying" was debated at some length. Mr. McCabe stated that he had a very peculiar clay to work and he found he could not use it without great loss after it had been frozen. Seventy-five per cent. of brick or tile made from clay that had been frozen would crack in spite of anything he could do to prevent it. His clay cracks badly anyway except when he can dry in the shade where there is no air currents, then he has no trouble.

Mr. Loy had trouble with die-made brick cracking in drying, they would check all over the sides. He now overcomes the difficulty by attaching to the die a piece of thin metal with rough or uneven edges which scratches or roughens the surface. The laminated surface he thinks is the cause of his trouble and the roughing of the outer surface overcomes that and enables the brick to dry faster.

Mr. Dawson said he mixed ashes and cinders with his clay which prevented cracking.

Mr. McLean claimed this use of cinders weakened the brick. He makes an excellent paving brick by mixing one-third potters' clay with the common.

Fourth Session:—Convention called to order by President Pike at 2:30 P. M.

The subject of "Road Drainage" was discussed at some length.

The Election of Officers resulted as follows: President, E. M. Pike, Chenoa, Ill.; Vice-President, Alex. McLean, Macomb; Secretary, G. C. Stoll, Lexington; Treasurer, Jno. McCabe, Rushville.

On motion the officers of the Association were constituted a programme committee and the convention then adjourned to meet the third Tuesday in January, 1890.

NEW INVENTIONS.

List of U. S. Patents issued since our last number appertaining to brick, tile, terra cotta, sewer pipe, pottery, etc., and the machinery used in their manufacture, compiled by Joseph A. Minturn, Engraver and Solicitor of American and Foreign Patents, Rooms 29 to 33, Old Sentinel Building, Indianapolis, Ind.: (Copies of any U. S. Patent furnished for 25 cents, postage prepaid.)
393,840. Culvert or Drain Tile—C. F. Mabis, Adair Co., near Green Top, Mo.

394,510. Brick Machine—R. N. Ross and H. H. Kellar, St. Louis, Mo.

394,528. Hydraulic Brick Machine—H. Von Metzlaß, Potsdam, Prussia, Germany.

394,842. Machine for Elevating and Delivering Bricks—C. H. Eichler, Dresden, Germany.

10,976. (Re-issue). Brick Mold Sander—A. Naylor, assignor to A. H. Newton, Cohoes, N. Y.

394,979. Brick Machine—G. Haut, Perham, Minn.

395,128. China Kiln—N. M. Fitch, Springfield, O.

395,212. Brick Machine—G. Campbell, Milwaukee, Wis.

395,590. Making Brick—G. Sattler, Sr., and C. Nagel, St. Louis, Mo., assignors of one-half to G. Sattler, Jr., East St. Louis, Ill.

395,689. Combined Brick Dryer and Kiln—M. A. T. Boehncke, assignor to Continuous Kiln Co., Omaha, Neb.

395,765. Brick Machine—W. Weeber, Philadelphia, Penn.

395,871. Brick Machine—J. J. Brewis, Chicago, Ill.

39,466. Tile Machine—C. Carr, Boston, Mass.

396,589. Making Rolls for Embossing Plastic Material—H. McHugh, New Bedford, Mass.

396,733. Brick Kiln—F. W. Dennis, Beatrice, Neb.

396,866. Brick Kilns—J. Taber, Wolfborough, Mass., assignor to himself and W. Emery, Alfred, Me., and G. M. Stearns, Boston, Mass.



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men will always be welcome. Address all commu-
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T. A. RANDALL & CO.,
25 Thorpe Block, Indianapolis.

COMING CONVENTIONS.

The Ohio Brick, Tile and Drainage
Association will hold its next annual
meeting at Columbus, O., Tuesday and
Wednesday, February 12th and 13th.

The Michigan Brick, Tile and Drain-
age Association will meet in convention
Tuesday and Wednesday, March 12th
and 13th, at Adrian, Mich.

SKILLED LABOR.

The introduction of machinery has
so deranged mechanical labor in nearly
all its departments as to seriously en-
danger a supply of skilled workmen
for the future. The apprentice of to-
day who learns the trade of a carpen-
ter and joiner, acquires only the art of
putting up work already prepared to
his hand at the planing mill or sash
factory. Bricklaying and plastering
are exceptions to this general rule.
The march of innovation has scarcely
touched these two handicrafts, and yet
the number of apprentices to these arts
is by no means keeping pace with
the demand for skilled workmen. If
it were not for the foreign supply the
deficiency would, even now, be seri-
ously felt.

The labor organizations have been
charged with producing this deficiency
by limiting the number of apprentices
which a master workman may have at
any time, and thus maintaining prices
by keeping the supply of skilled labor
below the demand. Whether the mo-
tive here assigned be the cause or not,
the limitation complained of certainly
has the effect to reduce the number of
well-trained workmen in these depart-
ments. The greater danger is that this
deficiency will be supplied by self-con-

stituted bricklayers and plasterers,
who have imperceptibly passed from
the hod to the trowel. These may ul-
timately make good workmen, but the
public must suffer from many an im-
perfect job while this skill is being ac-
quired.

But aside from this restriction of the
master workman, it cannot be denied
that there is an aversion in the average
American youth to getting down to
manual labor, and especially in the de-
pendent attitude of an apprentice.
This is an outgrowth of the commer-
cialism which has permeated society
everywhere. It is an insane desire to
accumulate wealth suddenly by the
exchange of commodities which the
labor of others has created. This is es-
pecially unfortunate at the present
crisis. The boy who to-day looks out
on the world with an inquiring eye,
which seems to say: what shall I do?
sees a vast continent lately reclaimed
from the forest and prairie, dotted all
over with cities, villages and farm
houses, built, in general, of frail and
perishable material which in the near
future must give place to permanent
structures, built of imperishable mate-
rials. Brick must take the place of
wood in all architecture whether hum-
ble or high, so far as walls are con-
cerned. Forty years hence, the great
demand of city, town and country, all
over this land, will be builders and
building material; and that means
brick, bricklayers and plasterers. The
youth who looks forward to the time
when our temporary buildings must be
replaced by permanent structures, and
qualifies himself to be an actor in that
crisis, will reap a rich harvest, and be
amply rewarded for the time and labor
given to this preparation.

STRENGTH OF BUILDING MATERIAL.

At a recent meeting of the Engineers
Club of Philadelphia, an interesting
report was made of a practical test of
the strength of building material. The
test related to the pressure per square
inch required to crush the material.
Massachusetts marble heads the list,
sustaining a pressure of 20,500 pounds
per square inch. Indiana limestone
(Oolitic, we suppose) crushed under
7,190 pounds, and Philadelphia pressed
brick yielded to a force of 7,210 pounds.
Common hard brick, laid in Portland
cement, sustained a pressure of 1,600
pounds, but if laid in common lime
mortar it yielded to a pressure of 800
pounds per inch. But no ordinary
building will give 500 pounds pressure
to the square inch. Under common

circumstances, the durability of a ma-
terial is more important than its
strength. There, hard-burned brick
stands at the head.

THE STRENGTH OF BRICK WORK.

Our readers will find on page 98 of
this issue an interesting communica-
tion from Prof. I. O. Baker under the
above caption. We have recently re-
ceived the proceedings of the annual
convention of the American Society of
Civil Engineers, held at Milwaukee
last June, when a number of papers on
the manufacture and use of brick were
read and discussed by the members.
We make the following extract from
Prof. Baker's remarks bearing on this
same subject:

"The general opinion is that brick-
work is in every way inferior to stone
masonry. This belief may have been
well founded when brick was made
wholly by hand by inexperienced operatives,
and imperfectly burned in the old-time
kilns, the product being then generally
poor; but things have changed, and
since the manufacture of brick has be-
come a business, conducted on a large
scale by enterprising men, with the aid
of a variety of machines and improved
kilns, the product is more regular in
size and quality, and in every way
better than formerly. I believe that
there are many engineering structures
in which brick could be profitably
employed instead of stone; as, for ex-
ample, the walls of box-culverts, cattle-
guards, etc., and the less important
bridge piers and abutments, particu-
larly of highway bridges. The correct
rule for such structures is to construct
them of as large stones as possible; but
if they are built of good brick, laid in
strong cement mortar, they will be
more nearly monolithic and better
than they generally are.

"Brick-work is preferable to stone
masonry in several respects, as follows:
1. In many localities brick is cheaper
than stone, since the former can be
made near by, while the latter must be
shipped. 2. As brick can be laid by
less skillful masons than stone, it costs
less to lay it. 3. Brick is more easily
handled than stone, and can be laid
without any hoisting apparatus. 4.
Brick requires less fitting at corners
and openings. 5. Brick masonry is
less liable to great weakness through
inaccurate dressing or bedding. 6.
Brick-work resists fire better than lime-
stone, granite or marble; sandstone is
the only variety of stone that can com-
pare with brick in power to resist fire.
7. Good brick stands the effect of

weathering and of the acids in the atmosphere better than sandstones, and in durability even approaches some of the harder stones. 8. All masonry fails when the mortar in its joints disintegrates or becomes dislodged; therefore, brick masonry will endure the vicissitudes of the weather as well as stone masonry, or even better, since the former usually has thinner joints.

"The heaviest pressure borne by any masonry structure—the towers of the Brooklyn Bridge—is a little less than 400 pounds per square inch (28 tons per square foot); while experiments made at Watertown showed the average strength of brick piers laid with mortar composed of one part Rosendale cement and two parts sand was 1,972 pounds per square inch (140 tons per square foot), and with a mortar composed of one part Portland cement and two parts of sand was 2,544 pounds per square inch (180 tons per square foot). The piers were built by a common mason with the same care as that usually given to ordinary masonry. If brick masonry of the quality of last-mentioned piers were substituted for the granite masonry of the towers of the Brooklyn Bridge the factor of safety would still be about $6\frac{1}{2}$; and if substituted for the limestone masonry, the factor would be 20.

"In conclusion, it may be well to state that I have no financial interest—even the most remote—in the brick industry.

THE CHICAGO BUILDERS' AND TRADERS' EXCHANGE.

The above named organization held its fifth annual meeting Monday, Jan. 21st. The reports of officers showed a satisfactory condition of affairs. During the past year the membership has increased from 509 to 574. Secretary John reported the available assets of the Exchange to amount to over \$17,000. The following officers were elected for the ensuing year: President, D. V. Purington; First Vice President, H. J. Milligan; Treasurer, Emanuel Earnshaw; Secretary, James John. Directors: Robert Vierling, C. B. Kimball, E. V. Johnson, Adam J. Weckler and M. B. Madden. Inspectors of Election for 1890: Fred G. Cobb, M. W. Powell and A. W. Murray.

This organization though in its infancy has already done a great work in uniting and harmonizing the different trade unions connected with building interests of Chicago, all of which are identified with it. Its material prosperity is therefore a source of much gratification.

BRICK, AN ARTICLE OF COMMERCE.

In the year 1888 the Hydraulic Press Brick Co. (St. Louis), put on the market seventy-three millions of brick. Besides the home consumption, the company shipped fifteen hundred carloads to points in Illinois and elsewhere. We observe that a branch factory at Findley, Ohio, turned out twelve millions of this amount. Of course we suppose that this Findley lot were made by steam generated by natural gas and burned by the same fuel. This is an immense saving, amounting to about one-half the expense of manufacturing by any other fuel, except it may be crude petroleum. The time is near when the Indiana gas field will furnish brick to the great prairie region west of us, at a cheaper rate, and of a better quality than they can possibly be made at home.

THE GREAT IRON TOWER OF PARIS.

Since the ambitious workmen of Shinar failed in their project of a tower of brick, "whose top should reach the heavens," men have been more humble in their aspirations. The highest of the Pyramids of Egypt reached but little more than 400 feet in height, and our Washington Monument was content to stop at 50 feet; but now the French are determined to outdo the folly of Babel. The Eiffel Tower in Paris is already more than 700 feet high and bids fair to reach its completion at 1,000 feet in March next. It is built exclusively of iron and steel, and rests on a massive stone foundation. It is designed for no use, only to look at, or rather, to look from.

Architect Osterling, of Minneapolis has projected an American folly almost equal to that of Paris. It is a house to be built of iron, 23 stories high! What about the blizzards of that climate?

PETROLEUM.

It is scarcely forty years since mineral oil came into general use for lighting purposes. At that time a corner of Northwestern Pennsylvania was supposed to be the only spot on the globe that promised a practical supply of petroleum. Subsequent researches, however, reveal the fact that scarcely a portion of the earth, of any considerable extent, is destitute of a supply of oil. While these discoveries are being made, the use of petroleum for fuel purposes has been introduced, and bids fair to be a successful rival of coal. Indeed, for convenience of use and intensity of heat it stands second only to

natural gas. The great Russian oil field on the Caspian Sea is largely supplying the European demand, and late intelligence from India informs us that an extensive oil field has been discovered in the Assam Valley, which will supply light and fuel for India. Such is progress in the nineteenth century.

A SUGGESTION.

It is claimed by some that no letter written by a true representative of the fair sex (an "effeminate woman") is complete without a postscript. Now, however this may be, we know that many times a brief postscript is the most interesting and pleasing feature of a good letter. We also know that men might profit in many things by following examples set by "their sisters and their cousins and their aunts."

We are led to these reflections by the knowledge that there is a short postscript that many of our readers could add to their business letters and by so doing afford much real satisfaction to their correspondents and also benefit us. It is short—only three words—and may be written thus:

P. S. The Clay-Worker.

NATIONAL ASSOCIATION NOTES.

There will be a meeting of the Executive Committee of the N. B. M. A. at Philadelphia, Pa., Feb. 13th, when the place and date of the next annual meeting will doubtless be determined.

One of the "poor unfortunates" who didn't get there writes under date of February 6th: "I have been very much interested in your report of the annual meeting of the Brickmakers and can readily understand that the promoters and members thereof have gained much more knowledge than it is possible to abstract and publish." Moral: Don't miss the next meeting.

The Corresponding Secretary of the National Brick Manufacturers' Association recently received from Vice President John McCain of Denver, Col., a remittance of thirty-four dollars, membership fees of all the brickmakers of Denver, who, be it said to their honor, join the National organization in a body. The Denver brethren have one of the best local associations in America and thus know and appreciate the benefits of thorough organization and affiliation. "What's the matter with McCain?" "He's all right."

Read the "For Sale, Wanted, Etc.," columns for bargains.

EDITORIAL NOTES and CLIPPINGS.

San Diego, Cal., is to have a pottery.

N. P. Foard will start a brick yard at Martinsville, Va.

McNeil & Belvine will run a brick yard at Rusk, Tex.

W. T. H. Lee contemplates building a brick yard at Easton, Md.

The East Palestine (Ohio) Pottery Co. has been incorporated.

The Bessemer (Ala.) Fire Brick Co. will build another dry house.

Lynchburg, Va., is probably to have a brick yard.

Nick Cruger, of Albany, Ga., is building a flue dryer and Morrison's Kilns.

The Roanoke (Va.) Brick Mfg. & Construction Co. will start a brickyard.

C. G. Nickel, a well-known brick manufacturer of Baltimore, Md., died recently.

The Rochester Pottery Co., of Beaver Falls, Pa., has been chartered; capital \$30,000.

The Canton & Malverne Fire Brick Co., of Canton, O., have incorporated; capital \$30,000.

The Illinois Pipe & Tile Co., at Sterling, Ill., has been incorporated. Capital \$30,000.

Chauncy Hyde, a veteran brickmaker of Chicopee, Mass., died January 19th, aged 76 years.

Jno. C. Hodges, of Golden, Col., has put in an Andrus Dry Press Brick Machine.

The Seattle (W. T.) Brick & Tile Co. has been organized with capital stock of \$50,000.

Paul Wooten's brick yard at Egg Harbor, N. J., was partly burned Jan. 22d. Loss, \$2,500.

P. B. Sager & Co., of Bay City, Mich., will increase their capacity by the addition of another machine.

An extensive bed of very pure kaolin is said to have been discovered at Golden, near Denver, Col.

B. S. Elmer, of Springfield, Mass., and C. B. Duddy, of Hartford, Conn., will go into the Terra Cotta business.

Mess. Chisholm, Boyd & White, of Chicago, are having a very satisfactory trade in Dry Press Brick Machinery.

The Grape Creek (Ill.) Clay Works will make brick by the dry press process having put in an Andrus Machine.

The Bessemer (Ala.) Fire Brick Co., contemplate enlarging their works to double their present capacity—20,000 a day.

Gladding, McBean & Co., well known Sewer Pipe Mfrs. of San Francisco, Cal., will manufacture Terra Cotta Lumber also.

H. W. Bricknam, Columbia Falls, Me., is making preparations to start a brick yard. He has a large bed of excellent clay.

Mitchell, Renz & Co., will start a brick yard at Bridgeport, Fla., and want a brick machine. They have a boiler and engine already.

Glen Ullion, Morton Co., Dak., is thought to be a desirable point for the establishment of a brick yard. Mathias Zinsmayer can give full particulars.

Jos. B. Oberly, of Perkasil, Pa., has bought T. W. Darby's brick yard at Wilmington, Del., and will put in another machine and additional racks and pallets.

Experienced burners and foremen desiring situations should scan the "Wanted" columns, or, better still, let their wants be known by proper announcement in that department.

The Brew Pottery Co., of Trenton, N. J., will remove their factory to Tiffin, Ohio. They employ 700 hands and have a capital stock of \$250,000. We presume they are after natural gas.

Persons having the circular of the well-known house of C. W. Raymond & Co., of Dayton, O., are requested to send for their 1889 supplement containing recent inventions and valuable improvements of interest to brick-makers.

A brick yard is wanted at Williamsburg, Franklin Co., Kan., which is thought to be an excellent location for a small yard. They have an abundance of good clay and good railroad facilities. For full particulars address G. F. Appleton, at that place.

F. W. Krause, of 107 South Leavitt St., Chicago, writes that he is preparing to start a brick yard near that city. He is favorable to the Dry Press process and will be pleased to receive correspondence or circulars from manufacturers of Dry Press machinery and also would like to correspond with experienced burners relative to the best kilns, etc.

Jonathan Creager's Sons, of Cincinnati, note the following recent shipments of Grand Automatic Brick Machines to J. Geo. Stamm, Butler, Pa.; E'ville Pressed Brick Co., Evansville, Ind.; Chas. Kuntz & Sons, St. Louis, Mo.; Jno. Stuckenberg, St. Louis, Mo.; Pach & Clark, Syracuse, N. Y.; Jno. Gale, Henderson, Ky., and Geo. H. Bruns, Brecon, Ohio.

Our well known contributor and genial friend, D. V. Purington, of Chicago, has been honored by election to the Presidency of the Builders' and Traders' Exchange of that city. We congratulate Mr. Purington on his preferment, for it is indeed a high compliment, and the Exchange on its wisdom in selecting for an executive one whose integrity and ability will not only reflect credit upon himself but the Exchange as well.

C. W. Raymond & Co., of Dayton, O., report that orders are coming in daily for their Perfection Brick Press and ornamental outfits. Among recent shipments made are those to New Orleans, La., St. Joseph, Mo., Crystal Springs, Miss., Sherman, Tex., South Riverside, Cal., etc. There is also a great demand for their New Automatic Dumping Car, large shipments of which have recently been sent South, a large firm in Augusta, Ga., having ordered fifteen.

TRADE LITERATURE,

An attractive catalogue has just been received from Mess. C. & A. Potts & Co., of Indianapolis, describing their Clay Disintegrators, Stock Brick Machine and Brick Mold Sander. The latter being a new but well tested candidate for trade favors. The title page of this catalogue is very suggestive representing the old-time and modern methods of tempering clay and making brick. They will be pleased to send a copy to any of our readers.

Bennett Bros. & Co., of Wellington, Ohio, have favored us with a copy of their handsome new catalogue of the well-known Quaker Brick Machine. The catalogue is unique in some respects being printed in three colors with the title page in gold. Write for a copy, mentioning the Clay-Worker.

Fletcher & Thomas, of Indianapolis, are out with a new 36 page catalogue of Brickmakers' Supplies. It is a very neat publication and contains much matter of value to the craft. A copy will be mailed free to any brickmaker. Write them for a copy.

P. K. Dederick & Co., of Albany, New York, who manufacture Dederick's Steel Case Bailing Presses as well as a line of Brickmakers' Supplies, have published a neat pamphlet illustrating and describing same and will send copy to anyone applying for same.

A NEW HOME FOR THE "GRAND AUTOMATIC."

While in Cincinnati recently we visited the shops of Jonathan Creager's Sons, manufacturers of the Grand Automatic Brick Machine, etc., and found them busy as bees getting out machinery for spring orders.

This enterprising firm have for some time been hindered in their work for want of sufficient room, having outgrown their present quarters which they could not well enlarge. The demand for their clay working machinery has increased to an extent that has compelled them to provide better facilities and to this end they are now completing a new two-story brick factory and machine shop two doors east of their present works which they hope to occupy by the 15th of February, after which date they will keep "open house" the year round to all who are interested in brickmaking.

The new factory will be equipped with the best of modern machinery and every convenience for the rapid and economical construction of their specialties thus enabling them to meet the demands of the trade for good, strong, well made machinery promptly and at reasonable prices. Their office will be located on the first floor of the new building, which, by the way, presents a very attractive appearance to those who appreciate good brick work being constructed of front and ornamental brick from the kilns of the Aurora (Ind.) Brick Co. We are pleased to observe this evidence of Messrs. Creager's Sons' prosperity but are not surprised by it for they have displayed a degree of enterprise and energy that seldom fails to command success.

THE CLAY-WORKER

VOL. XI.

INDIANAPOLIS, IND., MARCH, 1889.

No. 3

Written for the Clay-Worker.

EXAMPLES OF AMERICAN BRICK AND TERRA COTTA WORK.

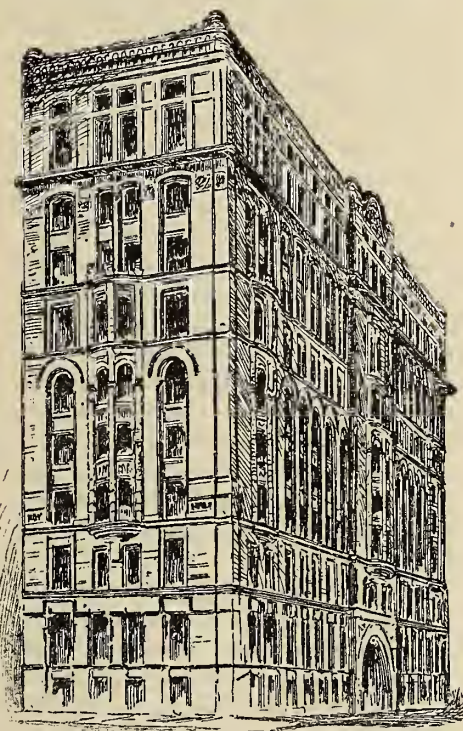
No. 14.

THE PHENIX INSURANCE COMPANY'S BUILDING, CHICAGO.

The Phenix building was designed by the well-known architects, Messrs. Burnham & Root, of Chicago. It extends the entire block on Jackson Street, opposite the Grand Pacific Hotel, from Clark Street to Pacific Avenue, and so has a frontage of 216.5 feet, while the depth on the other two thoroughfares is something over fifty feet. There are ten high stories—the topmost of which really contains two, with windows on all four sides, flooding with light the great space occupied by the Phenix Company—and the external effect is admittedly one of the finest and most imposing presented by any business building in Chicago. The first two stories are of Vert Island stone. The third story is half of stone and half of brick, and above the third story it is entirely of brick and terra cotta. The entrance, midway in the Jackson Street front, has a clear span of twenty-four feet. The vestibule is 20 by 45 feet. The peculiarity of the treatment of the fronts is the large number of strongly marked and highly enriched bay windows, which extend from the third story up to the floor of the ninth inclusive, and give to the offices in which they open great additional depth and outlook on the street. The cornice is in the form of a strongly projecting balcony, with richly carved parapet, which extends around on the level of the tenth-story floor, and on this balcony all the windows of the general offices of the company open. The two lower stories, of pinkstone, are closely related to each other in general grouping, the third story is isolated, the fourth and fifth stories are grouped together, and the sixth, seventh, eighth and ninth are thrown in one large grouping. The tall story, fully twenty-two feet high, occupied by the company,

is strongly accented in the design of the fronts, and the interior space is not broken by a single column.

If the exterior is harmonious in design and color, on passing within the great arch of entrance you cannot but admire still the strength and delicacy of outline and treatment. White marble everywhere in the grand entrance, in the massive steps, in the elevator arch, along every hallway, the glowing surfaces reflecting and still more multiplying the shafts



THE PHENIX BUILDING, CHICAGO.

of light from the scores of plate-glass windows. All the offices are in plain arrangement, finished in Cuba mahogany. The nine tiers of Phenix offices are among the most secure, the most thoroughly and elegantly finished, and the best lighted to be found anywhere.

The Northwestern Terra Cotta Co., of Chicago, have a special compliment in the Phenix Building. Anything finer than the terra cotta display in the enriched bow windows cannot be found in Chicago, and the same artistic design

and finished execution mark all their product throughout the building, indeed throughout the city.

St. Louis pressed brick could not have a better monument than the Phenix Building, the extensive contract being filled by Lockwood & Kimbell, of Chicago, the well-known dealers in this material, as also Trenton, Philadelphia, Zanesville, Milwaukee, and the other fine grades of pressed brick, which they ship by the carload throughout the Northwest.

The building is lighted throughout by electricity by the Edison incandescent system and there are five of W. E. Hale & Co.'s elegant passenger elevators, indeed every convenience known to modern architecture has been supplied regardless of expense. Four hundred thousand dollars was paid for the site and one million dollars for the building making the total investment nearly one and a half million dollars.

In an article on "Architectural Brickwork" in the London *Building News*, the resuscitation of the long dormant art of brick-cutting, moulding and carving is considered due to the Venetian Gothic craze and Queen Anne revival. The writer considers that to "Mr. Ruskin, the late Mr. Street, R. A., Mr. Norman Shaw, A. R. A., and Mr. Alfred Waterhouse, R. A.—worthy pioneers of the movement—we owe brick buildings that will compare with those of the previous century. If our brick architecture has not yet achieved a definite place in our recent history, it is because the trade of brickmakers and the crafts engaged in the work have failed to reach the standard which they attained in other countries and times. The Babylonish bricks were moulded and impressed with inscriptions of cuneiform character; they varied in size and shape, some over a foot square and three inches thick, others smaller, of less thickness; the adobes or sun-dried ones were laid in clay, bonded with matting of reeds, covered with bitumen every few courses, while the burnt bricks were laid in hot

bitumen. There are found triangular-shaped or corner bricks, arch-shaped bricks and other forms, showing that the manufacture had reached a high stage.

Written for the Clay Worker.

SOME PECULIAR PROPERTIES OF CLAY.

BY PROF. R. T. BROWN.

Perhaps it is owing to the very general distribution of clay, that so little attention has been paid to its chemical composition and physical properties. It is a weakness of human nature that we search for rare objects and devote special attention to them, while that which lies before us in every-day life, we pass with the slightest notice. The three earths that make up the great mass of the globe are generally present in the clay we tread on every day—two of them always. These are silica, alumina and calcia—or, speaking plain English, flint, clay and lime. The last two of this list are metallic oxides, or rusts, and the last may be, though it has not been demonstrated. These are rarely, if ever found in nature in a pure state. Clay, as we commonly find it is a compound of alumina and silica, in chemical union; and generally mixed with silica in the form of sand, uncombined. The gems known as rubies and sapphires are crystals of alumina. They rank next to the diamond both in hardness and in value. Pure alumina may be obtained by dissolving alum, and adding soda or ammonia to the solution, when the alumina will be precipitated in the form of a soft white powder, insoluble in water.

The primitive source from which clay, in its common form, is derived is generally admitted to be feldspar, an ingredient entering largely into the composition of granite and other crystalline rocks. From the decomposition of these we have the secondary forms of slates and clay shales, and these shales decomposing give us our beds of clay with their various mixtures of free silica, lime, iron, magnesia, etc. Feldspar is a crystallized silicate of alumina. When the feldspar loses its crystalline form by exposure to atmospheric agencies, it appropriates two equivalents of water, which gives it the form of an hydrated compound. On the presence of this water of hydration depends the plastic property of clay, which gives it its chief value. Chemists have doubted whether this water was chemically united with the compound or merely held by the powerful absorbent property of the alumina; but if this was the

nature of its union, it would be liberated in the form of steam at a temperature above the boiling point. But it requires a temperature above a red heat to liberate it; and when once driven off it can never be restored. Well-burned clay may be reduced to an impalpable powder, but that will not restore its adhesiveness, and on this depends its plastic property. The complete removal of this water of hydration is the condition on which the durability of all clay work depends. The loss of this water is the measure of the shrinkage observed in settling of a kiln when it is sufficiently burned. An expert burner measures the completeness and uniformity of his burn by the extent and evenness of this sinking, though he may not know why the surface sinks at all. The water held by the absorbent power of the clay is disposed of as soon as the temperature of the kiln reaches the boiling point, as is indicated by the watersmoke. As soon as this disappears, the uncombined water is gone, but the space it occupied remains and gives the brick its porous property. If the brick be now exposed to water, it will absorb what it lost as watersmoke, and will in time regain its plastic property and become clay again. But if the temperature be raised to a white heat it parts with its combined water and the size of the brick is correspondingly reduced, though the spaces left by the former reduction remain and the brick may absorb as much water as it lost at that time, yet it will show no tendency to go back to the condition of clay. From these facts we may safely infer that the portions of water lost at the two periods of burning, stood in a different relation to the clay.

In the clay in common use for brick-making, terra cotta, pottery, etc., silica appears both in a state of chemical combination and as a mere mixed ingredient; and each plays an important part in the manufacture. A good brick clay should not have less than 60 per cent. of uncombined silica in its composition. If the sand in combination is very fine and the proportion less than 60 per cent. the brick will be subject to loss by cracking in drying. If the sand be coarse and the proportion exceed 70 per cent. the bricks may mould and burn well, but they will lack strength. The presence of lime or magnesia to the extent of 8 or 10 per cent. with a high per cent. of fine sand will require great care to prevent the loss of the arches by vitrification. Iron is nearly always present in brick clay, and

on its presence depends the now fashionable color of brick and terra cotta work, but if the iron exceed six per cent. a very high heat may spoil the color by making it too dark. A clean coarse sand and a low per cent. of lime, while it may not mould very smooth, will endure a very high temperature without losing its shape, will be very hard and well adapted to paving purposes. But the physical condition of a clay must always be carefully examined in selecting material for clay work of any description. While clay is never crystalline in its structure, it is frequently granular and coarse in its particles. Such clays should never be worked without being thoroughly crushed, or well tempered in a good pug mill. The Chinese wash all the material for their fine ware and use only that which is last precipitated, which consists of the very finest particles. We can hardly afford to adopt that process, but we have clays which have been naturally washed and are already fine and free from granulations. In many places along our larger streams, low lands are flooded with backwater, in times of freshets, from which beds of finely washed clay have accumulated. The draining of our marshes have revealed beds of washed clay below the surface muck. This variety of clay, generally has a light blue or lead color, and on this account is frequently rejected by clay-workers, fearing a deficiency of iron to give the proper color. But this is seldom the case, as the iron, being combined with sulphur, is the cause of the color they distrust, and burning liberates the sulphur and restores the iron to the form of a per-oxide.

But perhaps the most singular, as it is the most valuable property of a pure clay is its complete neutrality. All its affinities are perfectly neutralized, and consequently it is removed from the liability to be decomposed by any extraneous agent. This insures, when perfectly burned, its permanent and perpetual durability, except when destroyed by some crushing force.

The Star Fire Brick Co., Pittsburgh, Pa., received an order for 25,000 fire brick to be used in the construction of a charcoal plant furnace at Durango, Mexico, to be erected by the Mexican Iron Mountain Manufacturing Company. The brick will have to be transported 100 miles in wagons, as there is no railroad nearer than that. It is said that the cost of delivering the brick will be \$250 a thousand.

Written for the Clay-Worker.

HINTS ON BRICKMAKING.

No. 34.

BY "R. BRICK."

After a number of years experience it is my opinion that the two great points in the business of brickmaking are, first, turn out the full capacity of your machinery every day; second, get this product into the market with the least possible waste, after the bricks leave the machine.

The waste in drying, burning and handling, should not exceed one per cent. To meet the first point it is necessary to keep the machine running continuously, for this is the fountain that supplies the stream of bricks; if this be stopped the stream is broken. If on the other hand you can keep the machine running, the supply will come without a break; if one hour is lost at the machine it cannot be regained. If the setting gets behind extra help will make it up; so with loading from the kiln. Therefore, don't let any small matter or a little unusual expense stop the machine. It may be necessary sometimes to put on one or even two extra hands to keep it running. It is better to do this. It is false economy to stop a machine to save a little extra cost. It is true economy to have enough men at the machine to do the work well. To get all out of a machine there is in it, it must be kept full of clay. Again there must be enough force to take away every brick that is made, and do this without injuring or destroying any of the bricks by hasty handling. Sometimes there are but two truckers when there should be three, and in the course of a day two thousand bricks are thrown back—all this loss to save one dollar.

It is necessary to have a few days supply of clay under sheds, so that rain will not interfere. It is also necessary to have an extra machine to insure a steady output; the saving of lost time in one season will pay for a machine.

We will suppose the weekly production of a works is 150,000 bricks, one week's expenses \$450.00 or three dollars per M., we will say labor costs \$1.25 per M., fuel cost \$1.25 per M., and regular or current expense, 50 cents per M. The latter includes salary of superintendent and book-keeper, other office expenses, horse feed, insurance, taxes, etc. When this works produces 100,000 in a week, labor costs \$125.00, fuel \$125.00, and regular expenses are \$75.00, or, a total of \$325.00 per 100,000 bricks, or, 25 cents

per thousand more than the previous week.

Next comes the point of saving the product after it is made. First they must be properly handled, then they must be dried under cover, to avoid loss by rains, and dried in a manner to suit the quality of the clay, so as to prevent loss by breakage. In drying, to make the output regular throughout the year, it is necessary to have artificial dryers.

After they are dried they must be properly burned, that is the important point, burn them well. Next, with the least cost for fuel and labor. As large a per cent. of the whole as possible should be hard without damaging or destroying any by overburning. To do this it is necessary to have permanent walls, and to prevent damage and loss in the arches from sudden changes of temperature there must, in up-draft kilns be furnaces and heat chambers interposed between the cold air and the burning bricks. In down-draft kilns the air is heated as it passes upward between the outer and inner walls. A kiln, first, must burn the bricks nearly all hard without waste, and with cheap fuel. It must be simple to operate and control. Another point, it must be durable, or its advantages will be overcome by the cost of keeping it in repair. If any brickmaker will turn out his full capacity every day and save it as described in the foregoing, he can make money in the brick business; without these points being attended to he cannot succeed.

The profits per thousand are too meagre to bear much theory or red tape. Theory has ruined many a brick yard. It takes a rich firm to stand up under the management of a man who has many theories to explode and little practical knowledge. It is well to be progressive but not well to sink all the profits in experiments and changing the order of things frequently. Get the appliances suited to your clay, location and capacity, and stick to them. Get the best there is in them and push your business. If you are not a practical brickmaker secure the services of one who is, and learn the business. Never let a customer wait for bricks. If it is necessary, load bricks all night; load them in the rain. Get up a reputation for promptness in filling orders and your sales will increase. Give a man good bricks, and ten hundred for a thousand, every time. Talk your business up, explain the advantages of brick over wood for building, its fire proof qualities, its

durability, etc. Advertise your wares so that people may know where they can get bricks. Have posters printed with name, address, and what you manufacture, and paste one on each side of every car of brick that leaves your works, and attend the annual meeting of the National Association of Brick Manufacturers and get all the new and valuable points of your business.

THE TILE'S BOAST.

[Read before the Iowa Tile and Drainage Association by T. E. Haines, President of the Association].

I am only a tile but in this age of light,
Full freedom of speech I will claim as a right,
I am moulded by man and hardened with fire
With clay for my parents both mother and sire.

My family record is old as the mountains,
They have written my name in beautiful fountains,
But the credit that's due me has not been bestowed
For I work on the farm as well as on the road

For the first time in my life I will boast of my worth,
Though humble, retired and lowly of birth
In praise of my work future ages will sing
Nor would I uncover my head to a king.

In seasons when floods of water prevail
My usefulness was never known to fail,
I work all the night and am busy by day
In carrying the surplus of water away.

When I venture to settle on low land or boggs,
My foes are the crawfish, the tadpole and the frogs;
But so soon as they find that the water is gone
They pick up their traps and seek a new home.

Sometimes I have spent the whole night on a tare,
In moonshine and darkness, foul weather and fair,
But like the obedient son or the daughter,
I never drink anything stronger than water.

I've a friend, the farmer, kind hearted and true,
I've gained all this friendship by draining his slough;
And then to complete the joy of his life,
I carried the water to please his good wife.

I am hard as a rock, and will never decay,
The storm that sweeps over can't blow me away;
Thus when I am planted down deep in the drain,
I'm a permanent fixture and always remain.

My work in improving the general health,
And also the farmers' material wealth
In every land has given me a name
That is covered with honor and glory and fame.

The philosopher's trouble is that while he can give fifty years to evaluating life impartially, life has spent several thousand years in shaping his prejudices.

Written for the Clay-Worker.

POTTERY.

No. 2.

It is curious how the classical forms of vases, drinking vessels and amphora have predominated over all others suggested by the ingenuity of the artists of many ages and races. The modern renaissance of the ancient models in pottery has more foundation than mere historical enthusiasm—the forms themselves have an artistic simplicity of decoration and a beauty of outline that have not been surpassed; and where departed from have led to a florid ornamentation that destroyed the simplicity, and the adoption of forms that have bordered upon the positively ugly.

It is even more curious as we find the germs of these classical forms far backward in the twilight of the human race. The Trojan forms we displayed last month are reproduced in Central Africa, Yucatan, Peru, and in Europe. Hogarth's line of beauty, the ogce curve, seems to have a universal birth place. But so has the gourd, the immediate predecessor of the earthenware vessel, and it is probable that more of the early forms were borrowed from that useful vegetable than were produced through an innate perception of the beautiful. The gourd-shaped and the cup or urn-shaped vase have been universally followed by all Runic people, and differ but little from the banks of the Enphrates, forty centuries since,

No. 1.—*Egyptian Water Jar.*

to the back villages of Scotland at the beginning of the present century.

A certain rudeness of outline and finish is perceptible on all hand-made pottery. The conception of the forms

No. 2.—*Grecian Vase—Archaic Period.*

were artistic, but they could not be executed, and it is only among those people who became acquainted with the potter's wheel that we begin to find natural beauty of form united with sufficient delicacy in structure to give it an elegant effect. Indeed, the art of pottery as an art, was not quite possible without this means to give it expression.

The earlier efforts in pottery were of form merely. Decoration was confined to simple lines, zigzag or wavy lines, and uncouth representations of birds, animals and human figures. With more delicate forms, these were seen to be incongruous,—in fact the same artistic perception that realized the elegant outline at once procured a more elegant and lifelike decoration. The owl-headed Minerva—a symbol of wisdom, was transformed into the stately and ubiquitous Athenae—an incarnation that even yet affects the beholder with consciousness of superior mental power. The stiff draperies, as if made of sheet iron, began to fall naturally over the figures. Mere skeletons were clothed with rounded muscles, and all the forms of life were imitated as nature made them.

In the last issue we presented some

examples of the early crudities. In this issue we give a few forms into which the crudity immediately melted. It is termed Archaic Greek, in which delicate forms are decorated with excellent conceptions, but in a stiff and conventional method. However, the improvement is prodigious, and but little more is needed to achieve the highest ideal of art expression—imitation of nature in her moods—free flowing, passionate, or placid.

An exception must be made, however. The Chinese, a modern people, are a remnant of the ancient world, and besides, their art grew up beyond the influence of Greek culture, that seems to have engulfed all other civilizations, ancient and modern. The example given is exquisite both in form and decoration, and the structure of the ware, as all know, is yet in advance of the best modern effort. Her decorative art is ungainly in conception, but superb in execution. Impossible dragons and genii innumerable disport in life-like and flowing attitudes, as if to attest their vitality; beautiful flowers and shrubs, of exquisite color and perfect shape, grow as if each were a world to itself. The grouping of figures the Chinese never understood. Their genius is

No. 3.—*Grecian Vase and Lid—Archaic Period.*

detail, gorgeous coloring and prinstaking finish.

The Greek forms and decorations were imitated throughout the entire Mediterranean circuit. Greek colonies in Italy carried their art with them, and it slowly extended westward through Etruria and the Islands. Generally the art suffered in the new hands. The Etruscans, especially, while they preserved the Greek purity of outline, degraded the decoration.

At this period those master clay workers, the Chaldeans had began to merge into a barbarous remnant, and the great city of bricks was crumbling into ruins. But their art had proceeded to the shores



No. 4.—Japanese Vase—Ancient Type.

of the Bosphorus, and into Persia. The Ionian, or Asiatic Greeks had early seized upon and improved the Babylonian art, by substituting life-like forms for the decorative of wares, instead of the emblematic but uncouth winged bulls and hieroglyphics. The Greek heroic age supplied its gods and goddesses from whom the likeness of man was presumed to be borrowed. They represented human passions, acting in a human way, and the effects are as strong to-day as human nature is enduring—as well understood now as in the days of Themistocles, a condition that accounts for the extreme vitality of Greek art and culture.

A Mississippi woman fell into a mill pond, and when she was rescued a ten-pound catfish was entangled in her wire bustle. Her husband wanted to set her again, but she would not consent.

Written for the Clay-Worker.

TESTING BRICK.

BY IRA O. BAKER, PROFESSOR OF CIVIL ENGINEERING, UNIVERSITY OF ILLINOIS, CHAMPAIGN, ILLINOIS.

Thinking that the results of testing the same class of brick in all the ways usually employed for such tests and of testing the several classes of brick under identical conditions, might be interesting and perhaps instructive, the writer undertook the experiments reported below. Incidentally he explains why different experiments obtain such diverse results, and gives data whereby results obtained under different conditions may be compared.

Table I. gives the result of experiments made by the author on brick from selected manufacturers in Illinois. A few general explanations accompany the table, and a detailed discussion of the manner of making the several tests will be found below:

frost. The less the amount of water absorbed the greater, in all probability, will be its durability.

Different methods are in use for determining the amount of water taken up by a brick, which lead to slightly different results. Some experimenters dry the brick in a hot-air chamber, while others dry them simply by exposing them in a dry-room; again some experimenters immerse the brick in water in the open air, while others immerse them under the receiver of an air-pump; and, again, some dry the surface with bibulous paper, while others allow the surface to dry by evaporation.

The absorbing power given in Table I. was determined by (1) drying the brick in a steam-heated room for three weeks, (2) weighing, and (3) immersing them in water for 44 hours; and then (4) drying for three hours, or until all the water on the surface was evaporated, and finally (5) again weighing them. The results

TABLE I.—TESTS OF ILLINOIS BRICK.

Reference No.	KIND OF BRICK.					ABSORPTION	TRANSV'SE STRENGTH.	COMPRESSIVE STRENGTH.		
	Condition of Clay.	Method of Moulding.	Locality.	Trade Name.	Proportion of Kiln represented by the Brick Tested.	Air-dried 3 weeks, immersed 42 hours and air-dried 4 hours.	Modulus of Rupture, pounds per square inch.	Average Dimensions of bed-area, inches.	Condition of Pressed Surface.	Observed Crushing Strength, pounds per square inch.
1	Soft.	Hand.	X	Soft.	15 per cent.	21.6 per cent.	143	.....	Not Plastered.	674
2	"	"	"	Face.	10 " "	19.2 " "	1,266	4x4 1/2	"	1,585
3	"	"	"	Paving.	50 " "	5.8 " "	1,057	2 1/2 x 3 1/2	Plastered.	11,340
4	"	"	"	Arch.	25 " "	.....	2,204	.....	.....	.....
5	"	"	Z	Best.	.....	2.5 " "	1,317	.....	.....	.....
6	"	"	"	Hard.	.....	1.1 " "	1,429	2 1/2 x 4	Plastered.	6,190
7	"	"	"	Paving.	60 " "	4.8 " "	1,117	2 1/2 x 2 1/2	"	4,360
8	"	"	"	"	60 " "	5.8 " "	963	3 1/2 x 3 1/2	Not Plastered.	4,911
9	"	Machine	Y	Face.	20 " "	9.0 " "	1,712	2 x 2 1/2	Plastered.	13,085†
10	"	"	"	Paving.	50 " "	4.5 " "	851	.....	.....	.....
11	"	"	"	Arch.	20 " "	3.3 " "	996	3 x 3 1/2	Not Plastered.†	8,486
12	Stiff.	"	X	Paving.	50 " "	6.3 " "	260	3 3/4 x 4	"	2,719
13	Dry.	"	Y	Face.	.....	10.7 " "	413	3 3/4 x 4 1/2	"	3,573
14	"	"	Q	"	.....	15.0 " "	3,217	.....	.....	See note below.
15	"	"	"	"	.....	2.2 " "	.....	.....	.....	.....

† Not Plastered, 6,190. See further remarks in subsequent discussion. † But the beds were quite flat.

EXPLANATIONS.—Identically the same brick were tested for absorbing power, transverse and crushing strengths. Each result represents the mean of three to fifteen experiments—the results for crushing strength are the mean of three, and the others the mean of seven to ten. The tests were made with the 100,000 pound testing machine belonging to the University of Illinois.

Nos. 3 and 10. Brick from the same makers as these are giving entire satisfaction in pavements.

Nos. 7 and 8. These bricks were taken out of a pavement, where they had shown great durability, for these experiments.

No. 13. These bricks were removed from the face of a building, where they had given fairly good satisfaction for sixteen years.

No. 15 is a new brick, recently put on the market, for which a crushing strength of 30,000 to 35,000 pounds per square inch is claimed. The writer tested a single brick on end up to 11,300 pounds per square inch, without developing any of the cracks or snapping sounds which always precede the failure of brick or stone in crushing tests. Such signs usually (but not always) appear at about half of the ultimate strength. The writer is having some specimens made to test this subject further. This brick is a striking illustration of the possibilities of brick manufacture. Brick is composed mostly of clay, which is largely alumina—one of the strongest of metals—and why should not a brick approximate to the qualities of a metal?

ABSORBING POWER.

The absorptive power of brick is one of the most important elements, since it greatly effects the durability of the brick, particularly its resistance to the effect of

in the table represent the mean of several observations. If the brick had been kiln-dried, or weighed before the surface water was entirely removed, the apparent absorption would have been greater,

Every precaution was taken to eliminate all sources of error, but the description of these precautions would be too long to be given here. The average result for ten experiments on each size was that the strength per square inch of a quarter-brick is about 50 per cent. of that of a whole one, that the crushing strength per square inch of a half-brick is about 66 per cent. of that of a whole one, and that the crushing strength of three-quarters of a brick was about 85 per cent. of that of a whole one. Before these results can be relied upon as being absolutely correct, they should be tested for other qualities of brick, since those employed in these experiments were rather soft, also since slightly different results can be obtained by combining the results in different ways. However, the results are probably sufficiently accurate for use in comparing results for crushing strength obtained with different-sized specimens.

The reason why a whole brick should be stronger per square inch than a smaller piece is apparent if a whole brick be conceived as being made up of a number of cubes placed side by side, in which case it is clear that the interior cubes will be stronger than the exterior ones because of the side support derived from the latter. To illustrate the effect of this lateral support, the writer applied a pressure to a small part of the upper surface of various materials, and determined the force which was required to crush them. The pressure was applied through a circular die about 0.6 inch in diameter. When the die was in the center of the broadest face of half-a-brick the crushing strength per square inch was from three to eight times the amount which would crush the brick when the pressure was applied uniformly over the entire upper surface. The relative strength under the two methods varied with the thickness of the specimen, and with the distance from the edge to the die. With a block of limestone 7 inches thick and the die 4 inches from the edge, the strength per square inch of the area under pressure was 25 times the crushing strength of the same material when the pressure was applied uniformly over the upper surface. This increase of strength was due to the lateral support derived from the material not under pressure. The quarter-brick and the half-brick have less of this lateral support than the whole one, and hence have a correspondingly less crushing strength.

2. The strength of the specimen will vary greatly with the degree of smoothness of its bed surfaces. To determine the difference between reducing the pressed surface to a plane and leaving them in the rough, the author selected six brick of regular form and apparently of the same strength, and tested three in the rough, and the other three after having reduced the pressed surfaces to planes by laying on a coating of plaster of Paris which, after drying, was ground off to a plane. The amount of plaster remaining on the surface was just sufficient to fill up the depressions. Both sets were tested in a hydraulic press between cast-iron, parallel (self-adjusting) pressing surfaces. The average strength of those that were plastered was 2.06 times the strength of those that were not plastered.

This difference will vary with the relative strength of the brick and plaster. The average strength of the bricks whose surfaces were plastered was 9,170 pounds per square inch, which is more than that of the plaster used; and, therefore, it is highly probable that if the surfaces had been reduced to planes by grinding, the difference in strength would have been still greater. A stone which uniformly gave a strength of between 5,000 and 6,000 pounds per square inch, when tested with plaster beds which had been allowed to attain their maximum strength, gave from 5 to 20 per cent. less strength than when the beds were carefully rubbed down to plane surfaces—the mean for ten trials was almost 10 per cent. less than the strength of the specimen having rubbed beds. Hence, if the pressed surface of the above brick had been rubbed down to a plane, the difference in strength with rubbed beds would probably have been about 2.26—instead of 2.06—times the strength with rough beds.

Formerly it was the custom to interpose a sheet of lead between the specimen and the pressing surface of the testing machine, "in order to distribute the pressure evenly." In crushing a material stronger than the lead, the latter is squeezed out sideways from under the specimen, which action introduces lateral forces that split the specimen before it can fail by crushing. For even moderately strong stone, the strength with lead interposed above and below the specimen is only two-thirds of the strength when crushed between steel. This use of lead was the custom formerly, but is almost wholly abandoned now.

3. As before stated, some experiment-

ers test brick flatwise, some edgewise, and some endwise. Since bricks are generally employed in such a position that the pressure is on the broadest face, it appears a little more satisfactory to lay the brick flatwise while testing it; but, since the only object in determining the crushing strength of brick is to compare the relative strength of different brick—the strength of the brick is only remotely connected with the crushing strength of the brick masonry—the position of the brick while being tested is not a matter of vital importance.

Doubtless the principal reason for testing them on end or edgewise is to bring them within the capacity of the testing machine. However, there is one good reason against testing brick flatwise, viz., all homogeneous granular bodies fail under compression by shearing along planes making about 45° with the pressed surfaces; and hence if the height is not sufficient to allow this shearing stresses to act freely, an abnormal strength is developed. For example, when a cube of reasonably homogeneous stone is subjected to a crushing force, it fails by the four vertical faces being forced off laterally. Each face carries with it a flat pyramid of which the vertical face is the base, and whose apex is at or near the center of the cube being tested; the remainder of the specimen then has the form of pyramids whose bases are the top and bottom faces of the cube and whose apexes meet at the center of the specimen. When a block of stone or brick, whose height is less than its length, is subject to a crushing force, the pyramids forced out at the side do not reach to the center of the specimens; and hence the interior portions are supported on the sides and consequently develop greater strength. This is, practically, only another explanation of why a whole brick sustains more per square inch than a half or quarter brick. (See item 2, above.)

The relative strength of brick tested in the three positions—flatwise, edgewise, and endwise—varies somewhat with the details of the experiments; but it is reasonably well settled that the strength flatwise between steel or cast iron pressing surfaces is from one and a half to two times as much when the brick is tested on end, and a few experiments by the author seem to indicate that the strength edgewise is a little more than a mean between the strength flatwise and endwise.

The latter part of Table I. shows the

result of experiments to determine the compressive strength of brick. The brick in Experiments Nos. 12, 13 and 14 were so smooth that the condition of surface could properly be described as "rubbed flat;" at least these brick should be considered as having been tested under as favorable conditions as those having "plastered" bed. No. 12 is a good example of the deception of a partial test. Although this brick shows a relative high crushing strength, a fairly good transverse strength, and a moderate absorption, yet it disintegrates rapidly under the action of frost in such a way as to show that it has a laminated structure and that the laminae are not well cemented. Although a critical examination of this brick with the unaided eye failed to detect such structure, compressing the brick sidewise and endwise never failed to reveal it. The strength given in the table is that when the pressure was applied to the edges of the laminae. An important conclusion derived from such facts is that the manner of behavior during the test is often more valuable than the final result. The behavior of No. 15 during the test of absorbing power gave a hint that possibly this brick also has somewhat of a laminated structure. This last can only be settled by further experiments.

The foregoing discussion of the effect upon the results of variations in the manner of making tests for crushing strength shows how necessary it is in using such results to have a clear understanding of the method of making the experiments and also of the effect of a variation of that method. To simply say that a brick stood so many pounds per square inch gives no idea whatsoever of the quality of the brick.

PAVING BRICK.

BY J. J. W. BILLINGSLEY.

The best pavement for the money, is the question of the hour with the city authorities of many cities. This is especially true of the cities of rapid growth in what was known as the "Far West," a few years ago, but now the Middle States. The westward flow of population makes the investment of capital in the development of towns and cities so as to secure the most desirable share of this tide of immigration a very important question. How to provide city advantages so as not to burden unneces-

sarily with debt, and at the same time make the advantage so inviting as to secure the settlement of enterprising citizens, especially those who have capital to add to the wealth and importance of the city's growth, is a question of paramount importance.

Towns and cities take on a personality as much so as men. They are known for what they are, and not for what they might be. The wide-awake members of the City Council are always ready to support measures that look forward to the best development of the cities' interest. Chief among the questions that come up for consideration, and that will not down but keeps coming, is that of street improvement. There are several important points to be considered in the selection of a pavement. The cost of the pavement should not bankrupt the city, besides its durability in proportion to the cost should, by all means, invite its construction.

The most durable pavement in proportion to the cost may not be desirable on account of the character of the surface to be traveled. Cobble stones, for instance, may be so laid as to last a great while, and yet as a travelway the street may be avoided, or if the travel is compelled to pass over such a street, it is done at a slow pace and great discomfort to men and horses,—the vehicles are racked and wrenched, and the horses lamed. Streets having a smooth, solid surface, but sufficiently springy to admit of the more rapid transportation with less damage to both men and horses, are in every way most desirable. A little additional cost should not stand in the way of constructing a durable and desirable pavement. By the word desirable we mean a street that will draw travel on account of the character of the surface to be traveled. Wooden block pavements offer a smooth and springy surface for three or four years; after that time it will require more or less in the way of repairs, and at the end of eight or ten years they have to be replaced altogether. They are costly pavements, and not durable.

KINDS OF PAVING.

Block stone pavements are costly and durable, but rough, always rough, hard on vehicles, horses and those that use them. Asphaltum pavement is costly, smooth and springy for a few years. The surface wears rapidly, and soon becomes uneven and not easily repaired. At Washington City, where there is probably more of this pavement in use than

in any other city in the United States, the writer only last May examined several streets paved with asphaltum that were fast wearing away. While it is a very pleasant pavement to travel over, yet the cost and want of durability make it objectionable to some extent at least.

AS TO BRICK.

In the past two years the use of brick to pave streets has been receiving considerable attention.

Sixteen years ago, Charleston, West Virginia, had one street paved with brick. The street has been subject to a constant, heavy travel with little, if any, repair worth naming, and we are informed that the pavement is in good condition. After several years of trial the city is improving their streets by paving with brick. At New Cumberland, West Virginia, they speak very highly of brick-paved streets. At Stuebenville, Ohio, the writer examined a street that had been paved eight years, and was surprised to find the pavement in most perfect repair, and the surface so smooth as to hardly indicate that it had been traveled for more than a year. We have, however, examples of the utility of brick paving nearer home. Fourteen years ago the writer witnessed in part the laying of one square of brick paving on the principal traveled street in Bloomington, Illinois, being on the west side of the court house square. The pavement was laid by Mr. Heafer, a well-known brick-maker of that city. Since the laying of it the writer has occasionally visited that city, and at no time have we failed to examine the wear of the pavement. It has more than met expectations, and the city to-day has, we are informed, several miles of streets paved with brick.

Decatur, Illinois, commenced to use brick for paving their streets four or five years ago, and their use has met with such favor that they have put down several miles of brick pavement. At Galesburg, Champaign, Peoria, Lincoln, Springfield and Danville, and other towns and cities in Illinois, there are many, many miles of brick pavement. In Ohio brick are coming into general favor for street paving. The greatest hindrance to the general introduction of brick for paving has been the opposition of a few engineers, until quite recently. In my own city we have not tried brick for the reason that our City Engineer will not investigate the merits of such a pavement. He is a kindly fellow that knows all there is to be known in his profession and entertains the opinion that when he

*Read before the Iowa and Ohio Tile and Drainage Associations.

says no that that ought to settle the question for evermore. In presenting the matter to him on one occasion, he took up a common brick and a two-pound hammer, and striking the edge knocked off a piece of the brick, saying, "Don't you see it won't do?" But we said to him, "If you take a stone with a sharp corner and give it a like stroke the same result would be experienced." Brick pavements are not a new thing under the sun, to be classed alongside with some of Edison's discoveries. In the Netherlands and Holland the highways are paved with brick. A traveler may drive for days without encountering a dirt road, except occasionally, some of the roads have been paved more than a century. They are easily kept in repair, inexpensive after being constructed, and are splendid travel ways. When properly constructed they are smooth, springy and durable. "Hard as a brick" is a common saying, and there are hard bricks, and brick ought to be hard for this purpose, and if well laid they form a most desirable travel way.

QUALITY OF THE BRICK.

The success of brick pavements will depend very largely upon the character of the material used and the construction. Brick may be hard—approaching a flinty hardness, and yet not suitable for a brick pavement, for the reason that they are easily broken. There is a marked difference in the character of the clay from which the brick are made. Some clays will make a hard, tough brick—not easily chipped or marred in any way; and such brick should be used in pavements. Mistakes will be made as to the character of the brick that are used until those having the work in charge learn as to the character of the material that should be used to secure the most desirable pavement. Those having the work in charge, and who are supposed to stand between those who pay the bills and those that do the work, should keep a sharp look out that no material is used unless fully up to the required standard of excellence. The taking of two brick and knocking them together until their character as to hardness or toughness is pretty fully determined, is a way of testing that does not often fail to discover defects if they have any.

Again we would emphasize the necessity of using all hard brick—that is, every brick should be hard. We believe, from years of observation and investigation, that clays of desirable character may be

found conveniently near to make pavers for almost any locality, after the brick-maker has learned how it should be managed. There is no danger of any monopoly of the business, or scarcity of material to be anticipated. If every street and highway in this state had to be paved, there would be no lack of material, if they were all made as broad as the "Appian Way."

In a paper read before the late meeting of the National Brick Manufacturers' Association the writer made the following summary of reasons as to the desirableness of brick pavements, which we repeat here for the reason that we have as yet seen no cause for making any change in the claims then made, which were as follows:

1. Brick make a smooth pavement, over which a heavy load may be drawn without a jolt. Draft horses can easily draw a third larger load at greater speed than they can over a bouldered or rough stone pavement. In addition, both team and wagon are subjected to less wear and strain. For light vehicles, there is a most striking comparison. It is a pleasure to sweep along without a jolt or a jar, whereas over cobble-stones it would be a test of strength to the team and carriage, and a tribulation to those that travel them.

2. Brick pavements are desirable because of their durability. The instances before referred to sufficiently attest this claim.

3. The abundance of the material at command and comparatively without cost.

4. The pavements are easily repaired. No other pavement can claim so much in this respect. If a brick proves to be imperfect, replace it with another and the work is done.

5. Brick pavements are less expensive than other pavements, if durability, wear and tear of teams, vehicles, and comfort, are taken into account.

CONSTRUCTION.

First the road-bed should be crowned a little, and well underdrained so as to fully insure a solid and dry foundation, which may be the cheapest and at the same time the most efficient way to secure this is by laying two lines of drain tile, two or more feet inside of the outside line of the pavement on each side.

After the necessary grading, add three or four inches of sand, then a layer of brick laid flat, then an inch or more of sand, followed with a layer of brick set on edge, and the spaces filled by spread-

ing an inch or more of coating sand on the brick, allowing travel to wear it into the spaces between the bricks. Another and a cheaper method is a very perfect grade rolled with a heavy roller coated with three or four inches of sand. Set brick on edge and settle with heavy tamps, and then coat the top with sand as before.

Where sand cannot be had in sufficient quantities the bed for the brick may be made smooth, even, and soft, or pulverized to a depth of two or three inches on the surface—the brick set on edge and settled with tamps, and the cracks or crevices between the brick filled with pulverized earth. Another method is to make the grade desired cover with a slight layer of sand cover sand with boards. Spread an inch or more layer of sand, then set brick on edge and spread sand over surface as before.

In conclusion, is it too much to anticipate that in no very distant future we shall see not only the streets of our towns and cities paved with brick, but also our highways. A pavement 25 feet wide would suffice for public roads. Roads are said to indicate the degree of civilization attained by those who people a country. Have we not attained a degree sufficiently advanced to warrant the prediction of brick-paved highways? The need is imperative, the material abundant, and the enterprise not wanting in a few. With a little education in this direction the way seems fully open. With tile-drained farms, yielding maximum crops, and paved highways that may be traveled at any season of the year, over which may be transported to market the immense surplus, will mark a period in our history never before witnessed in the advanced civilization of our people.

Why Fires Burn Brightly in Winter.

There are several reasons why a fire burns so brightly in frosty weather. First, the air being cold is denser, and the heated air and gases from the fire are comparatively more buoyant. Consequently there is a greater draught. Then the air, being denser, contains more oxygen in an equal volume, and that gas being quickly supplied, the combustion is fiercer and more perfect. In frosty weather, too, the atmosphere is comparatively free from moisture, which of course has a tendency to damp a fire. For the same reasons fire generally burns more briskly at night, than in the day.

CORRESPONDENCE.

THESE COLUMNS ARE OPEN TO ALL. THE FULL NAME AND ADDRESS IS REQUIRED BUT WILL NOT BE PUBLISHED EXCEPT WHEN PERMISSION IS GIVEN BY CORRESPONDENT. THOSE DESIRING TO COMMUNICATE PRIVATELY WITH ANY CORRESPONDENT WHOSE FULL NAME IS NOT GIVEN CAN DO SO BY ADDRESSING LETTERS CARE OF CLAY-WORKER.

The Village Brickyard.

Editor Clay-Worker:

To a mind trained by long practice to observe cause and effect the village yard offers many interesting and not unprofitable problems. How many of us in the hurly burly of a busy life stop to consider and use the simple tools that lay near at hand. All of us a hundred times have wondered how hot our kilns in burning brick become, but as pyrometers are both scarce and difficult to apply, our knowledge in that direction is quite limited.

It occurred to the writer several years ago that a general idea of what was going on in that same hot kiln could be approximated by the use of various metals placed in the several parts of the kiln, and for the purpose of comparison the following melting points from the best scientific authorities at hand are noted:

Tin.....	melts at (Silliman)	442°
Lead	" " "	612°
Zinc.....	" " "	773°
Silver.....	" " "	1873°
Gold.....	" " "	2016°
Cast-iron.....	" " "	2786°
Copper.....	" " (Nystrom)	2160°
Brass.....	" " "	1900°
Common fire (wood)	" "	1100°
Brick kiln, { Clay-Worker, } 2000-2700°		
{ Sept. 1887. }		

All the above Fahrenheit's thermometer.

In September, 1887, a selection of commercial metals readily obtainable by every one was made, and they were placed in four brick and fired in our usual manner 88 hours, the kiln having a settle of 9½ inches, and being slightly stuck in the arches with a first-class top.

BRICK No. 1.—Set in face of arch 8th course from bottom, and burned black ¼-inch deep, nearly all over, and contained the following:

Zinc, fluxed with sand and surrounding clay, and colored sides of hole ¼-inch with dull yellow, similar to yellow crockery—no metal remained in the hole.

Tin, united with sand only, and left a fragile core of white ash—no metal remained in the hole.

Lead, fluxed to a brownish-black glaze, and run out of the hole, dripping on the brick below—no metal remained in the hole.

Brass, fluxed with sand and surrounding clay, and colored the same ¾-inch deep with dull gray, about the shade of cast-iron—no metal remained in the hole.

Copper, oxydated, and about half the metal dissipated, the balance left with corners rounded, and of a dull black outside, but solid as before firing, when cut with a file.

BRICK No. 2, Set in rounding between arches and burned hard as a good paver,

13th course from bottom.

Zinc, Same as in No. 1.

Tin, Same as in No. 1.

Lead, Same as in No. 1, except it remained in hole and formed a mass of black glaze, with sort of lead-colored core of same texture.

Brass, Same as in No. 1.

Copper, Same as in No. 1, except the remaining metal was enclosed in a nodule formed of the oxydation, the original metal having a brilliant film or coat of dark-red.

Cast Iron, oxydated, corners rounded, clay burned fast to oxydation, particularly to those parts of the iron that had been recently broken—probably lost one-tenth of its weight.

BRICK No. 3, Set in 21st course, and burned extra dark-red.

Zinc, Same as 1 and 2.

Tin, Same as 1 and 2.

Lead, Same as 1 and 2.

Brass, Dissipated same as 1 and 2, without residue but exact impress of original metal remains in the plug.

Copper, Similar to No. 2, except no nodule formed, coloring of original metal a more brilliant red.

Cast Iron, Same as in No. 2, but did not lose so much weight, say one-twentieth off, oxydation has appearance of blue-black velvet, clay burned fast to fresh fracture only.

BRICK No. 4, Set 35 high (kiln only 36) was well-burned hard salmon.

Zinc, Burned to a white ash, but shows the original shape of the metal.

Tin, Formed a firm core with the sand.

Lead, Fluxed to a brown, otherwise same as Nos. 1, 2 and 3.

Brass, Metal in original shape, but fragile from oxydation, and very slight metallic lustre.

Copper, Slight nodule surrounding but retained every mark of the cutting tool. No brilliant color.

Cast Iron, Very little oxydation, free of clay except at one freshly-broken end. Same form as when fired.

The above samples were burned six in each brick by boring holes in the brick, dropping the raw metal in each hole and plugging each hole firmly with clay and sand.

The result of this experiment shows that zinc, tin and lead have no value for determining the heat of a brick kiln in any part, as they are either driven off in vapor, or combine with the surrounding clay into new forms.

It also shows that no part of our warmest kiln will melt cast-iron or reach 2786 degrees, or we should find the raw cast-iron recast in the hole or driven off by the long-continued firing.

This, then, leaves as only the copper and brass as an index of our heat. The brass, of course, will vary much, because rarely uniform, running from 1800° to 1900° and the copper, according to seven authorities at hand, varying from 1996° to 2192°.

Here, then, with these two metals, our total variation, according to the authorities accessible, is from 1800° to 2192°.

Now let us look at our samples in brick No. 1, in the hottest part of our kiln, and we find the brass all gone, hence over the minimum heat of 1800°, and we find only half our copper gone, showing that we have not reached its melting point of say 2192°, for if we had reached this heat our copper would either be recast after being in a fluid condition, or driven off while in that condition. Our other samples show by reference to the same metals considerable less effect from the fire.

During the year 1888 these experiments were repeated with brass, copper and cast-iron, with similar results to above-named, and at the same time copper, silver and nickel coins were included, being set in the 7th, 15th and 27th course in a kiln set 36 high. All the coins but two in the 27th course, out of a total of twelve, were entirely destroyed. As none of them are a single metal, but a mixture of two metals, of course their melting point follows the usual rule of being less than the average of both. Their great surface in proportion to weight no doubt also tended to their destruction.

It would be a card in favor of some of the improved kilns if the owners would give us the result of such a test that some of us old fogies with open-top Philadelphia kilns might make a comparison of what they really have to offer us.

A VILLAGE BRICKMAKER.

Call Again, the Latch String Hangs Out.

Editor Clay-Worker:

It was my pleasure to visit your city about the 10th of January, and while there I called to see you twice, and found you out each time. Being one of your subscribers I had a great desire to form your acquaintance, and have a pleasant chat. I was on my way to visit Messrs. Penfield & Son's works, and was taking in the different cities of the West, especially the brick works. I found Messrs. Penfield & Son very agreeable gentlemen, and I felt as though I had known them all my life. I was shown through their immense machine and brick works, and was very much surprised at the extent of their works. Machines loaded on cars, some ready for shipment, and a great many in course of construction, besides crushers and pug mills. They were too busy to spend much time in showing me around. We have been using their machinery since 1880, and from our experience would not have any other. I have seen a great many different kinds of brick machinery, but I am satisfied with what we have. There are other machines here, but we get the cream of the business, from the fact that we make a better brick, and we give Penfield's machinery credit for it.

The brick business in this section is looking up, and the prospects are very bright for this season.

Wishing you much prosperity for your valuable Clay-Worker.

GEO. O. BERRY,

COLUMBUS, GA.

On the Right Track.*Editor Clay-Worker:*

Enclosed find one dollar, to pay one year's subscription for Clay-Worker. The Lancaster Brick Co. was incorporated last April; have 105 acres of good clay-land, situated on the line of the New York, Lake Erie & Western Railroad, about twelve miles from this city; have two Martin machines, with the pallet system. We are young in the business, and learn something new almost every day and are willing to learn more, and therefore find your journal very interesting and profitable reading. O. T. S.
BUFFALO, N. Y.

About Burning.*Editor Clay-Worker:*

In reply to the article on "Burning Brick" in your December number.

I did not know that an experienced burner had just one way to burn. A practical burner generally has several ways. A burner must use good judgment. When burning, if he finds by making his fires some other way it would be to his advantage, he must do it.

The article says, "burning the heads of a kiln forms a chimney." That is not necessary if he changes his fires from one side to the other. He will have no chimneys in burning this way unless there is a choke somewhere.

By changing the heads a kiln can be burnt in shorter time and burn the heads out closer than by burning the center first.

It also states, "if the fires could be started way back in the arches." That can be done after the first thirty hours. When you set your arches put some large, heavy wood in the center, when it is nearly burnt up shove your fire from the mouth to center—keep no fire at the mouth, put the doors part way on, to suit the draft of the kiln. When you see the watersmoke coming from the center in good shape then draw your fire to the heads and you will find that it will work well.

W. A. R.

Referred to Our Readers.*Editor Clay-Worker:*

Being a subscriber to your paper, and always reading its contents very carefully to seek information, I would like to ask some practical brickmaker through the Clay-Worker, what is the most desirable length to set the benches in burning in clamps, and whether brick set uniform throughout the kiln will burn as many hard as to have, say one or two courses set tight as spreaders, and whether the amount of fuel in each case would be the same. I have usually set three over three, above the benches, with a couple of flat courses of burnt brick on the kiln to hold the heat, with very good results; but am of the impression that a couple of tight courses about equal distance apart in setting 35 or 40 high, would be better.

A YOUNG CONNECTICUT BRICKMAKER.

From a Brickyard to the State House.*Editor Clay-Worker:*

Enclosed you will find \$1.00, for which you will please renew my subscription to your paper. As long as I continue in the brick business, I want to see all the new ideas that may be advanced in the trade. To get them there is no better medium than I know of than reading your reports of the work of the conventions, as well as practical communications from the craftsmen. Every brickmaker in the country should read the Clay-Worker. The brick trade hereabouts has been very dull for more than a year, but under the administration of our new brickmaker Governor the prospect looks more favorable for this year. Perhaps there are few who know that General Alvin P. Hoovey, now Governor of Indiana, was once as poor as the poorest of us, and worked in the brickyard, but such is the fact, so here is encouragement for a class who have been looked down upon as worthy of little consideration. Thanks to the efforts of a few enterprising, energetic men, the trade is taking its place at the front of the leading manufactories where it belongs. So that, though a boy, starting like General Hovey, wearing his rags and working like a slave, even in a brickyard, may with proper energy and intelligence, stand at the very top of the ladder of fame. But the world moves, and so does the trade of brickmaking. I hope you will continue to prosper.

EDWARD BROWN.

MT. VERNON, IND.

The Cost of Burning.*Editor Clay-Worker:*

R. R. Gray says "less talk and more figures," and then tells us that "a continuous kiln will burn brick for one-fourth the amount of money that the open kiln will," everything else being equal, and then after scolding us for not giving reliable data to work from, proceeds to give us the figures.

To make everything equal he takes 240,000 brick in an open kiln and 300,000 brick in a continuous kiln. A difference of 60,000, brick. Doesn't give us the time of burning, only says 45 cents per 1,000 for labor; wood, two cords per arch of 20,000 brick at \$3.00 per cord, and half-ton coal per arch at \$3.50 per ton.

Then he gives us the continuous kiln for 300,000 brick—time of burning, 15 days; 60 tons dust at \$2.25; two men at \$2.00 per day; total cost in continuous kiln 65 cents per 1,000, and says cost in open kiln is \$2.50 per 1,000.

That is a good showing for the continuous if he is right, but is he? Let us make some figures on his basis. I will take the same number of brick as in his continuous kiln, 300,000, or 15 arches of 20,000 each. Take his cost for labor, which is too large, 45 cents per 1,000, \$135.00; 30 cords wood, at \$3.00, \$90.00; 7½ tons of coal, at \$3.50, \$25.75; total, \$250.75, or 83 35-100 cents per 1,000 instead of \$2.50.

The last, and as good a kiln as we ever

burned, was one of 300,000, in six days, with two men off and two on: four days labor, \$48.00; and cost of coal, \$150.00; total, \$198.00 or 66 cents per 1,000. The kiln before that contained 474,000; same labor, \$48.00; coal, \$237; total, \$285.00; cost per 1,000, 60 60-474 cents.

Do I want any continuous in mine? Not any, thank you. Cost of coal at kiln, \$4.25 per ton. We use two courses plating, and cover the top from the heads in one-third of the distance with light sheet iron to hold down the heat and send it to the center where it always comes out last. We also use 30 quarts of anthracite coal dust to every thousand brick in the pugging of the clay. Dimensions of our moulds, 81½ cubic inches. When I get my breath, if Mr. Gray doesn't scalp me, I will try again.

S. P. CRAFTS.

NEW HAVEN, CONN.

From "Way Down East."*Editor Clay-Worker:*

I am much interested in the articles in the Clay-Worker on burning and setting.

We in the East use wood for fuel; burn in the old-fashioned open-top kilns, with temporary walls put up and taken down with each kiln. We burn from 40 to 50 cords of forest wood to the 100 M., at a cost of from \$2.50 to \$3.00 per cord.

It appears to me, that the expense for fuel is too large, as I read the figures in the estimates of your correspondents. I would like to ask your old burners whether they "coal" in watersmoking or settling. Our way here is this: When the kiln is scoved and daubed, we commence a fire in the mouth of the arches, let it work in gradually (the arches being charged with wood when set) until the charging is burned out, then we let the arches cool until they are dark, when we fill them again with dry elifted wood and start the fire again until this filling is burned out, when we do the same thing again until the steam is off and the fire or heat begins to show at the top, then we shut up one head or close the arches on one side tight and burn out a filling or "dressing," as we call it, then we cool again until the arches are dark, when we fill again and burn from the opposite side or head; this we continue to do until we have the proper settle—about 14 inches. Usually we are about five days in getting watersmoke off, and four to five days in settling making the whole time from nine to twelve days. We call a kiln good when the hard brick are within two courses of the top, and one or two from the heads or ends.

From what I read of your burns in the West I infer you get a much larger per cent. of hard brick than we do.

We set our arches ten high, and kilns from 38 to 42 brick high, and about 45 brick long. If we get 200,000 merchantable hard brick we call it a good burn.

Of course we have a large amount of bats including our walls. Our markets are mostly the cities and large towns, and

the larger part of our brick go by water. Our clay is of a superior quality, easily worked, and we make only soft mud brick, take our clay from bank to soak pit. Our yards are all on the river, or near the shipping port.

I think our great mistake here is in burning. I am satisfied we might economize our fuel with improved kilns and improved methods of burning.

South Penobscot, Me. E. R. B.

A Good Word For Continuous Kilns.

Editor Clay-Worker:

I wish to say something in favor of continuous kilns. I have a Boehncke & Rohwer Continuous Kiln on the yard I am superintending. This kiln was built last year, but the whole business was started too late in the season, so that they could not make bricks enough to run the kiln through the rainy season. I had to stop making bricks on the 12th of November on account of the rain setting in. Having no drying sheds on my yard at all and using the Fletcher & Thomas Pallet System, I lost about 200,000 green bricks in one night. We do not need drying sheds here in this beautiful country, because not a drop of rain will come during the time from about April 1st to October last; so we are able to make bricks enough during this time to run the kiln all year round. And I will do so this year. My two Quaker machines give me 60,000 bricks every day, 30,000 I need for my kiln and the rest I store away for winter use. I dump the bricks on pallets and use horse trucks to convey them on the yard, where the pallets are piled up, ten high and three to four feet apart. In this way the bricks are bone-dry after three or four days.

Also, I use horse carts to take the bricks from the yard into the kiln, four hundred bricks making one load.

My kiln works splendid, like all the kilns of this kind built in the U. S. We have not one salmon brick in a compartment of 25,000. If the green bricks are put in dry enough and the fire watched carefully, the burnt bricks are very near all even in color and quality, and this without any loss on account of brickbats or cracked and broken bricks, and with very much less fuel than anyone else can burn bricks with in this country. I use a New Mexico screened coal, which costs \$7.00 brought to my yard. I need about two and a half tons a day to burn 25,000 bricks, so that 1,000 bricks require about 75 cents worth of fuel. Every other brick yard will need about \$3.00 to \$3.50 here in this country.

Of course the erection of a Boehncke & Rohwer Continuous Kiln might be more expensive than that of another good kiln, but this expense will be made up in one year by saving in fuel. Besides that, I only need one fireman at a time.

I am very sorry that Mr. Daniel Edward Ryan, who gave "A Pilgrim's Views and Observations" in your last No. did not visit the brickworks of the Sacramento Transportation Co., at Sacramento, Cal.,

and that "A Student," who was "Among the Brickmakers," did not find the two kilns at the Brick & Terra Cotta Mfg. Co., at Omaha, in running shape. Both gentlemen would be convinced that the Boehncke & Rohwer kilns give perfect satisfaction.

F. HARPER.
Inglewood, Cal.

Starting Right.

Editor Clay-Worker:

Inclosed find one dollar, for which please send us the Clay-Worker, for one year. The Clay-Worker is indispensable to brick makers, and as we are to begin the manufacture of brick very soon at this place, we thought the first thing to do would be to subscribe to the Clay-Worker. We are to put in Brewer's latest improved machine, which will be run by a twenty-five horse-power Water Town engine. Our capacity will be 35,000 brick a day. Wishing the Clay-Worker much prosperity.

GARY PITMAN & Co.

ALBANY, GA.

The "Yellow Dorg" Again.

Editor Clay-Worker:

I don't know that I, your humble "yaller dorg" country correspondent, can write anything that will interest your many readers, but, you see it just popped into my head to say a few words about how we used to prepare clay for brick-making, when I was an apprentice boy.

To begin, we dug the clay in the fall, winter and spring, at times when we could do nothing else. The boss kept us busy for months, digging and wheeling clay into great mounds, to take the rains, frost and ice, until the season opened for brickmaking. Well, what do you think? Let me tell you, that that clay when it was "ground," "tempered" and "pugged," (I believe scientific brick manufacturers use the above terms), worked into mud suitable for hand-moulding, was nearly good enough to eat.

But, of course, it's not up with the times now-a-days. To work clay direct from the bank or pit, is the rage. Now, sir, I feel in my bones as "yer yaller dorg" brickmaker, to attempt to convince any one that digging clay months before it is needed for brickmaking, is an advantage, would be up-hill business.

It is said that improved machinery does the work now. May-be it does. But I for one am not fully satisfied on that point.

Now don't, whatever you do, understand me as one opposed to machinery. No sir, not once.

Yet, I am inclined to the opinion, after years of experience and trials in a small way, that all clay, so far as I have seen, will work better and smoother, and can be moulded either by hand or machinery with greater ease, when, as I stated, the clay has been dug months before using, giving time by the action of the weather on it to sweat and crumble little by little of its own accord. It is, so to speak, live clay, and when thrown into

the soak pit it loses all of its rough parts and works more like good wheat dough.

If you are making brick by the "semi-dry clay" or "stiff mud process," you can do so with clay thus prepared. You need not dump the clay into a soak pit.

I feel a little ticklish about what I am writing, because, you see, some of the big city "brick factorists" might lick me. As "yer yaller dorg" brickmaker you see, I haven't had the chance to delve down deep into the science of clayology.

You see, too, that some of my words are not of the latest date. Particularly so those on the scientific terms now in vogue by brick factorists.

Never mind, I am learning slowly. I have just ordered a Latin dictionary from New York. As soon as it arrives I shall paint in large Latin letters, "*E Pluribus Unum*," and proceed to nail it up for my brick yard sign. I think it will take right along. Don't you?

I hope the brickmakers had a good, pleasant and jolly time at Memphis. May they one and all live to meet again many times as the years come and go.

A COUNTRY BRICKMAKER.

Information Wanted.

Editor Clay-Worker:

Can you give me the address of some one who makes a patent draw lime kiln, one of the best in use. What machine do you consider the best for paving brick? I use the J. W. Penfield stiff-mud machine, side cut, but it looks to me the end-cut would be the best. I have a very fine clay for both white and red brick, and I think the clay will make a fine paving brick. I use the Raymond Repress, and must say that I am proud of the brick I make with it. I shall put the terra cotta dies on this year, and make both white and red trimmings. All the trouble I have is with the red, they are hardly as dark as I would like, and if I am not very careful to get them perfectly dry before setting they will have a little white stain. I set face to face so the ends are the most bother, and on ornaments they bother, but after they are burned and exposed to the weather, they grow nicer all the time, and a little darker. This white stain does not get any worse, but better with age. But if I make the ornaments of it, then I will be bothered more, and if you can suggest anything that will be of help to me, you will do me a great favor.

CHAS. MARSHALL.

LAZY WORKMEN.

There are some men who are too indolent to make any improvement in their workmanship, being perfectly satisfied to plod along in the old ruts that have been made by their predecessor, content to take things as they find them, and make no effort toward improvement. This is a progressive age, and one calling for progressive minds to develop. With all the inducements that are offered at the present time, the mechanic who will not at least make an effort to rise is very indifferently indeed.—Ex.

AUTOMATIC DUMPING CARS.

We give on this page illustrations of "Raymond's Automatic Dumping Cars." The demand for a car of this kind for light grading, gravel pits, brickyards, plantations, mines, etc., led to its invention.

It has so far met all requirements, being on several occasions put to the most severe tests of earth transportation. The novelty of the cars consists in their being entirely automatic.

By throwing the lever, which can be done by a boy, the bed dumps by weight of the load, the greater weight being up-

which allows the load to dump on either side or end.

They are strongly built of best seasoned white oak. Self-oiling boxes and chilled wheels are used in construction. They are in fact, fully up to the highest standard of work of their class. They will be manufactured by C. W. Raymond & Co., of Dayton, Ohio, who are now erecting a large plant to better facilitate their rapid production.

A POTTERY EXPOSITION.

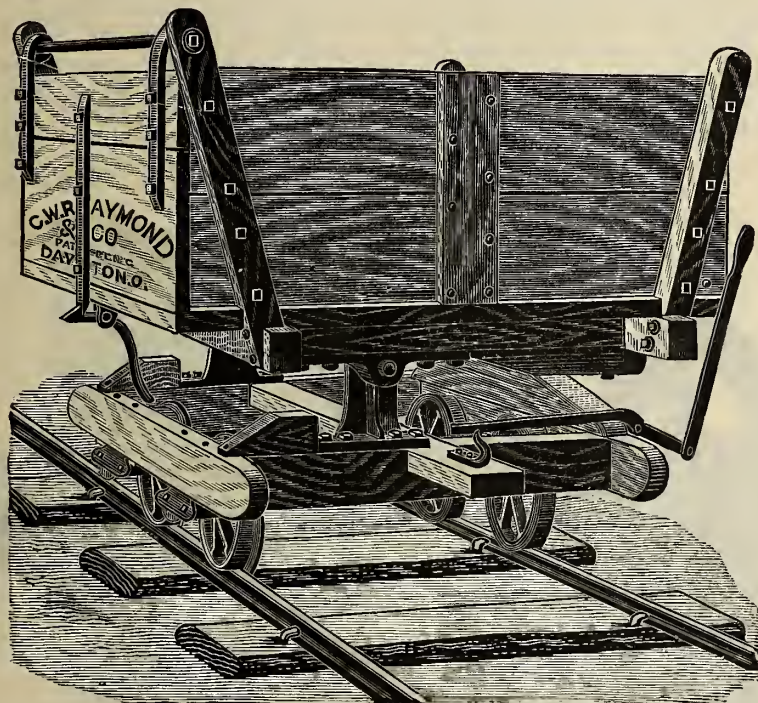
An important movement has been started for the holding of another pottery, porcelain and glassware Exposition in Philadelphia this fall. The Exposition will be held under the supervision of the

Committee on Exhibitions of the Pennsylvania Museum and School of Industrial Art.

The American Potters' Association at their last annual convention held at Washington, D. C., selected a special committee to report in reference to the proposed exhibition. This committee presented a carefully prepared report from which the following is an extract:

"The place of art is not only in public galleries. It is, above all, in the house and at the fireside of the people. Being very largely an agricultural community, the people of the U. S. must of necessity, with accelerated strides, become more and more manufacturers. To be successful it is clear that our manufacturers must become more and more artistic; must put more of the art quality into their work, for the U. S. pays millions every year to the superior artists and artisans of other countries. The labor we have to dread is the skilled labor of the old world. * * Our art publications, our magazines with their marvellous illustrations, are doing much to uplift the wares, but many of our people do not come under their influence; cannot afford to buy, but they must have a cup to drink from, a jug to hold water, and by giving them these articles beautiful in form and decoration, simple and inexpensive though they be, we can do much to train the eye, and thus meet the minds and hearts of men and women. * *

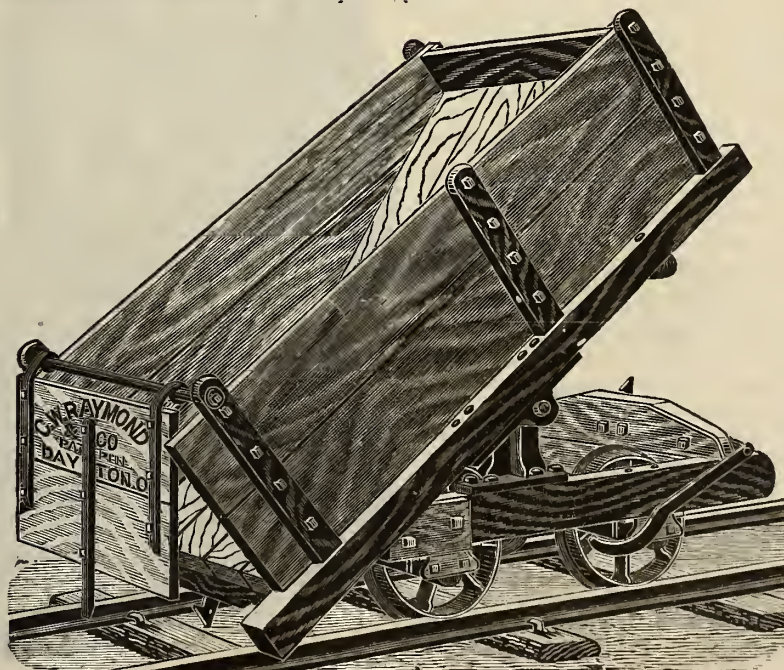
A meeting will be held in the early future at Philadelphia, where the Trustees of the Pennsylvania Museum will confer with the Potters Committee and prominent manufacturers and individuals interested in the projected exposition. The preliminary arrangements will be decided upon, schedules of prices made, etc. It is expected that the display of stained glass and glass ware will be very handsome. Connected with the regular exhibition there will be a loan collection and a large and valuable historic exhibit."



on the dumping side of the pivot bar. After load is expelled; the preponderance of weight being upon the reverse side, causes the bed to right itself on the trucks, locking itself securely thereto and fastening its own end gate.

No labor is required either to dump the load or return the empty bed to position.

The large cut shows the side dump $1\frac{1}{2}$ and 2 cubic yards capacity. Cars of 30-inch gauge of these sizes are kept in stock. Cut No. 2 shows the end dump 1 and $1\frac{1}{2}$ cubic yards capacity. The latter car is especially adapted to brickyard work, dumping into pug mills, soak pits, etc. This car can be dumped by arranging a trip bar on the track, which, as the loaded car is drawn past raises the lever, which secures the bed to the trucks allowing it to dump as before described, at any desired point. The same car is also made with a rotary attachment



A SPLENDID BRICK PRESS.

We illustrate herewith The "Brewis" Dry or Semi-Dry Press Brick Machine (Pat'd. Aug. 18, '85, and Jan'y. 8, '89,) which as it is now placed on the market is the most perfect Dry or Semi Dry Press Brick Machine built. These machines have now been on yards in practical operation since 1885, during which time improvements and changes have been made, the objectional features removed and weak parts made stronger, until a strength, simplicity of construction and perfection have been attained, which make it the most powerful, efficient and durable machine yet produced, and practically unbreakable.

Mess. Chas. Kaestner & Co., Machinists and Founders of Chicago, Ills., well and favorably known as extensive manufacturers of Clay Working Machinery, being convinced of its superiority over all competitors, have made its construction a special study and will keep on hand a complete line of all sizes, that may be called for, One, Two and Three Mould, with capacities ranging from 7 to 21,000 in ten hours.

The following description with illustration serves to make those interested, acquainted with some of its claims to superiority:

The main frames in which the Pressing Mechanism works and which also furnish bearings for the main Crank Shaft and Counter shafts are all fitted together with planed surfaces and so bolted together with an interior frame and the mould table with turned bolts as to allow no opportunity to get out of alignment, thus always making a perfectly true and square cornered brick. The machine is built with two sets of toggles, operated by a double Cast Steel Crank Shaft, which operating the toggles in different directions and against each other, entirely relieve the Frame from any of the Thrust or Strain peculiar to this class of machines. Besides having the advantage of more wearing surfaces. Connecting the upper ends of the toggles with the lower Cross head carrying the lower dies, are the main "Side Bars" which having a cross section of 22 square inches of hammered steel, entirely avoid all springing under the immense strains they are subjected to during the pressing and lifting out of the brick.

The mould table is fitted with a feed box of improved and patented construction and capable of adjustment in any direction where there is any liability to wear, thus rendering the work of the machine accurate, in this one of its principal parts. These moulds are fitted with Steel liners which Messrs. Kaestner & Co. have manufactured expressly for this purpose, combining the greatest amount of wear with a smooth and polished surface, these liners can be taken out for replacement, either with a new set or special set to make fancy brick that an architect may call for, in an incredible short space of time. They are also provided with dies having steam heating appliances to prevent the ad-

hering of clay that may have to be worked damp and is therefore sticky.

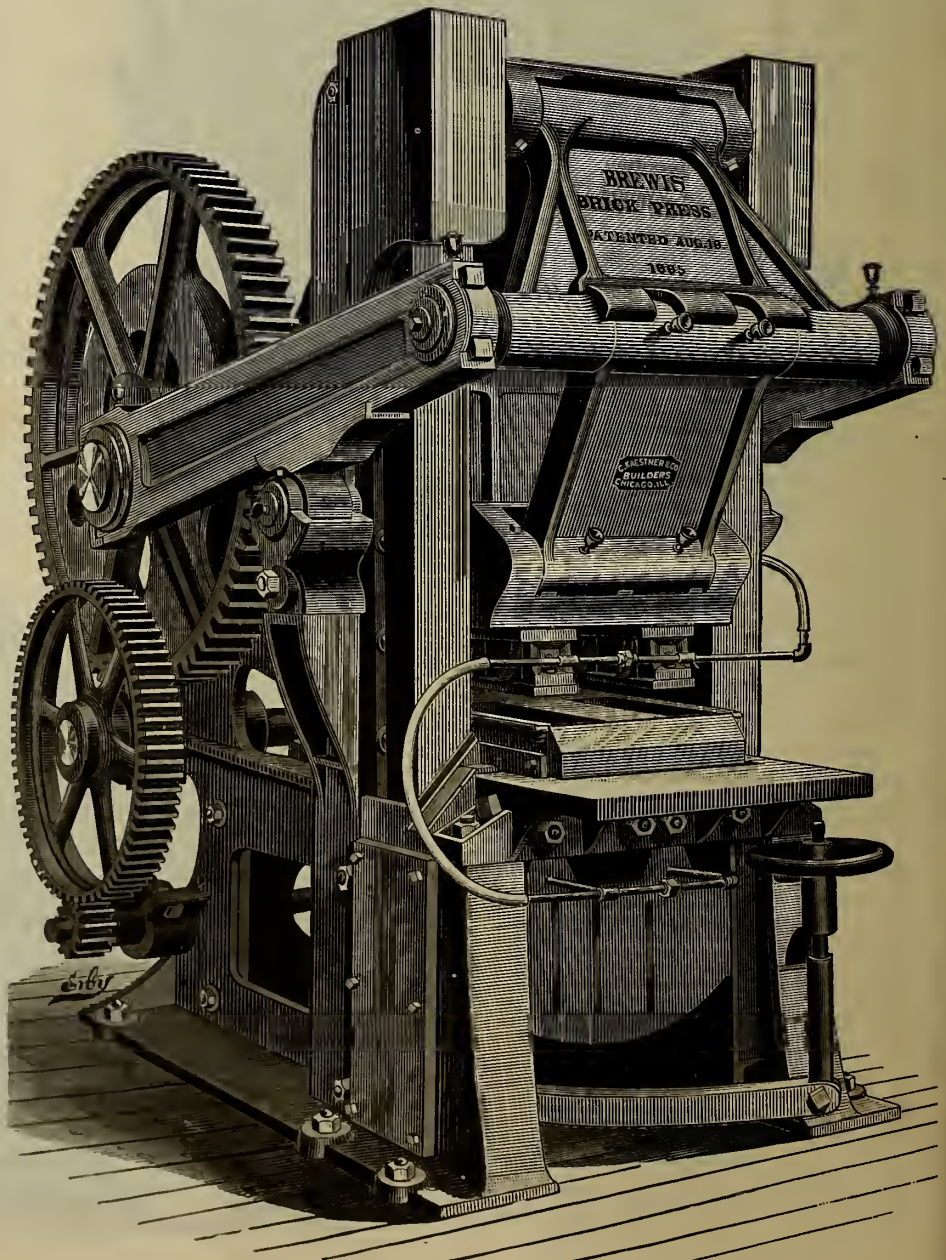
All Shafts, Bolts, Pins, Friction Rolls and wearing surfaces that are subjected to either wear or tear, and strains are made of Hammered or Cast Steel, as are also the cross heads connecting toggles, side bars and the one carrying the upper dies, thus extending the life of a machine by reducing the wear and obviating the chances of breakage.

This machine free from any weights, drops, or non-positive mechanism, but by movements peculiar to itself, and which are securely covered by letters patent combines a moving and pressing of the clay within the mould, which by entirely working out the air, produces a brick void of any granulated center surfaces, as each brick is made at the lower part of the mould, by traveling up they are given a polish and smoothness hitherto unattained, except partially in a so-called "Cam" machine, the best samples of which, would bear no comparison

to one of this principle, as any disinterested user can testify. Each machine is fitted up with one of the Kaestner Pat'd. Friction Pulleys to place the machine more completely under the control of the operator and subjected to more severe tests before leaving shop than it will ever be called upon to perform in any yard, even in the most careless hands.

The manufacturers determined from the first undertaking of its construction to combine the greatest strength, simplicity and speed possible, as well as the delivery of the brick with perfect faces, edges and corners square or ornamental and in every way a desirable product and from the record the machines have already made, they feel sure that they are presenting to the trade a machine in every way worthy of public favor.

Messrs. Kaestner & Co., the sole licensees, are prepared to furnish the machines on the most favorable terms and will ship them to responsible parties, al-



lowing an actual trial of thirty days before settlement is asked. Where other machines are now being operated on yards they will place the "Brewis" Improved Machine alongside, and if the brick made upon it are not better in every particular, purchasers are at liberty to return the machine free of expense to them.

Those interested in the manufacture of fine brick we are confident will find it will pay to write to Mess. Kästner & Co. for full particulars. Clays sent to them will be tested free of charge and the sample brick returned.

Testimonial.

Office of Hampshire Pressed Brick Co.,
Hampshire, Ills., February 15, '89.
Messrs. Chas. Kästner & Co., Chicago, Ills.

GENTLEMEN:—Before purchasing our Brewis Brick Press last season, we thoroughly investigated the merits of all so-called first class Press Brick Machines, and selected the Brewis (formerly the Acme) because we considered it the strongest, and least liable to wear. We are pleased with our machine and will show it to intending purchasers, at work on our clay, which many of the machines seeking favor failed to handle. We believe the Brewis to be the best machine made.

Yours truly,
MARTIN STRYKER, Pres.

Messrs. Kästner & Co. also have an extensive trade in Engines, Boilers, Pumps, Shaftings, Pulleys, Hangers, etc., and make a specialty of the Boyd & Raymond Pulverizers, which they offer at prices that defy competition. Write for prices addressing Chas. Kästner & Co., 303-311 South Canal St., Chicago, Ill.

NOTES BY THE WAY.

At Marion, O., the Marion Steam Shovel Co. are having a large demand for their Clay Excavators, seven of which they have put into Chicago brick yards. Mention of some of these excavators have been made before in the Clay-Worker. The firm speaks in very high terms of the Clay-Worker as an advertising medium. The business of this firm has grown so rapidly that they have had to increase their capacity in many ways to supply the demand for their goods.

BUCYRUS, O.

The Frey-Sheckler Co. is behind on orders. The reorganization has given them the use of a large building and increased capital, adding very much to their capacity. In addition they are planning extensive additions to their present buildings. They are planning to so increase their manufacturing facil-

ities as to meet every order for clay working machinery promptly. At present they are compelled to beg for a little time on some of their orders. They have some valuable improvements which they have perfected within the past year which will further add to the popularity of their machinery.

This firm is giving special attention to the matter of furnishing plans for plants and other needed information to those who may be establishing or enlarging brick or tile works. At

TECUMSEH, MICH., H. BREWER & CO.,

Are compelled to add night hours to the day to meet their orders. Among the many valuable improvements that they have added to the extensive line of their machinery the past few years, we make special mention of their Automatic Cut-off for brick, both side and end-cut. We witnessed its operation with interest. It is a marvel of simplicity and efficiency, cutting two streams of clay at once, making four brick at each operation, of exact length. In looking at it operate the relation of part to part, the why and how it is done with such perfection can be seen at a glance. The cutting of side-cut brick is quite as perfectly done. There is not a catch, hitch or skip of any kind, it does the work and does it well. Their No. 6 Brick and Tile Machine is meeting the demands of the trade; the only trouble at this time is to supply the number of machines demanded. Orders have been coming in every day and still they come.

The Brewer-Sword Brick Machine manufactured by this firm is having a good run. They are more largely in demand in the Southern States. H. Brewer & Co. have added new improvements to this machine, increasing its popularity very much. They also manufacture the Sward Brick Machine.

Very few manufacturers can say as much as this firm in the general satisfaction rendered in the conduct of their trade. They make it their business to see that their machinery gives satisfaction. They are always to the front in every needed improvement. They have under way other surprises for their trade.

KELLS & SONS, ADRIAN, MICH.

This firm is still the same stand-by, making no ado over their business, but making haste slowly, supplying the demand as faithfully as if the earth's revolutions depended upon it. They report a good trade.

THE ADRIAN BRICK & TILE MACHINE CO.

This firm has an Automatic Cut-off

Table that works very satisfactorily indeed. They are giving much attention to the manufacture of machinery adapted to brickmaking. They have put a large number of their machines in the brick yards at Kansas City. They report a very satisfactory trade so far, this season.

THE MICHIGAN BRICK & TILE MACHINE CO.,
MORENCI, MICH.

Are making a specialty of Brick and Terra Cotta Lumber Machines. For the manufacture of terra cotta lumber they claim a special superiority. They have more orders for machines for this purpose than they are able to supply.

IOWA TILE, BRICK AND DRAINAGE ASSOCIATION.

The Iowa Tile, Brick and Drainage Association held their annual meeting in Agricultural Hall of the capitol building in Des Moines, February 6th and 7th. The attendance was good and the papers and discussions of more than ordinary interest. The members very generally reported an improvement in sales and prospects good, with few exceptions. The drouth of two years past seriously effected the tile trade but the later rains have revived the trade. The brick trade is reported uniformly good, and very many tile men have added the manufacture of brick to their business. The use of brick for street paving received much attention. Members of the city council were present to learn all about it. Mr. J. J. W. Billingsley, of the Clay-Worker, by request, read a paper upon the subject before the convention, which we give in full on preceding page of this number.

The city of Des Moines has contracted for all the brick paving that manufacturers of paving brick in that vicinity can supply. There is an abundance of good clay near the city. The only question is capital and men to make the brick. Several moneyed men were present ready to establish plants if the prospects justified the investment.

At the close of the meeting we were informed that three companies were organizing to put in brick works.

The following were elected officers for the ensuing year: President, T. E. Haines, Altoona; Vice-President, Harry P. Smith, North English; Secretary, G. S. Chambers, Des Moines; Ass't Secretary, J. L. Smith, North English; Treasurer, Wm. Kettell, Tipton, Ia.

Next annual meeting will occur on the second Wednesday in February, 1890, at Des Moines.



INDIANAPOLIS, IND., March, 1889.

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Terms of Subscription.

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Ten copies, " "	8 00

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ADVERTISING RATES FURNISHED ON APPLICATION.

Correspondence on all subjects of interest to Clay
Workers is solicited. Communications from practical
men will always be welcome. Address all commu-
nications to

T. A. RANDALL & CO.,

25 Thorpe Block, Indianapolis.

RATHER PERSONAL.

If a little pride is ever pardonable it is when one dons new garments. Pardon the CLAY-WORKER, therefore, gentle reader, if we seem a little vain as we make a complacent bow and present ourself in a new dress. While we are proud of our improved appearance we are determined that the improvement shall not be in appearance only. At every point where improvement is possible, whether in the matter presented to our readers or in the manner of presenting it, we are determined to forge our way ahead and compass the widest possible field for the benefit of our readers and advertisers. Those who are following after must quicken their pace if they keep in sight.

In this issue we present several papers of more than passing interest and value that should receive careful consideration from every reader. To our mind this is an exceptionally valuable number, rich in practical thought and suggestion. Prof. I. O. Baker's contribution under the title, "Testing Brick," should receive special attention. There is a false impression in the minds of many as to the strain put upon brick—the weight they must sustain in ordinary buildings. What are usually termed soft brick are amply strong enough for all ordinary building purposes. We do not say this to encourage the manufacture and use of poor brick. Not at all, but rather to combat the idea entertained by some who ought to know better that a brick suitable for walls that must sustain heavy weight should show a crushing strength of several thousand pounds per square inch.

DON'T MISS IT.—The following (April) issue of the CLAY-WORKER will be an unusually valuable number. We already have some very interesting communications from both old and new contributors. Among the latter, and worthy of special mention, is the first of a series of articles on "Brickmaking and Burning," written especially for the Clay-Worker by Mr. Jno. Cray, an able writer, and, as well, a brickmaker of sixty years' experience, having been actively engaged in the business from boyhood, working nearly all kinds of clay, both North and South, from which brick can be made, thus being perfectly familiar with every method and detail. These articles treating as they will in a plain terse style of the whole art of brickmaking must prove of great value. Prof. R. C. Carpenter will also have a valuable paper in the April number on "*The Strength of Brickwork and other Qualities.*" As we said before, don't miss it.

A TRIP EAST.

Early in February in company with a baker's dozen of jovial companions, members of the Indianapolis Builders' Exchange, we steamed out from the Hoosier capital bound for the city of "Brotherly Love," to attend the third annual convention of the National Builders' Association.

Though long, the journey was a pleasant one, time cannot drag heavy in such company.

Our genial friend and neighbor, J. C. Adams, "Brickmaker to the President," officiated as chaplain and set the "pace," which, though by no means slow, was maintained to the finish. Many pleasant incidents occurred during the trip that may happily be lived over again and again, in memory at least.

AT PHILADELPHIA

Our hearts were made glad by cheerful greetings from friends, many of whom we had not seen for a twelve month, and we were treated to such an exhibition of warm hearted fellowship that it makes us hold our fellows at a high premium.

Never have craftsmen been more royally entertained than were the Builders and their friends by the Philadelphia Builders' Exchange, whose hospitality knew no bounds.

THE BUILDERS' CONVENTION.

A fine body of business men, well groomed and seemingly on good terms with themselves and all mankind, assembled in the convention hall, Franklin Institute, Philadelphia, Tuesday, February

12th, and took up the associational work in good earnest. The attendance was all that was anticipated, the list of members showing a substantial increase over the previous year.

Many questions of importance were considered and several valuable papers on subjects of interest to builders were read and discussed. As a verbatim report will be made and published in pamphlet form a copy of which can be secured by any who are interested by applying to the Secretary, Wm. H. Sayward, of Boston, Mass., we will not now undertake to mention further the proceedings except to add that the next meeting will be held in St. Paul, Minn., January 20th, 1890. The following is the result of the

ELECTION OF OFFICERS:

President, EDWARD E. SCRIBNER, St. Paul, Minn.

First Vice-Pres., JNO. J. TUCKER, New York City.

Second Vice-Pres., A. MCALLISTER, Cleveland, O.

Secretary, WM. H. SAYWARD, Boston, Mass.

Treasurer, GEO. H. TAPPER, Chicago, Illinois.

THE BANQUET,

Which seems to be an established feature of the meetings, was given in the Horticultural Hall, which was beautifully decorated. More than six hundred happy mortals were here treated to a rare feast. On every plate was laid a "menu card" and souvenir of great beauty in the form of a book bound in satin bearing upon the cover the inscription, in gold, "Plans and Specifications." In addition to the menu, toasts and programme, the book contained some excellent engravings of prominent buildings in Philadelphia, all executed in the richest manner.

During the banquet a handsome portrait of Mr. John S. Stevens, ex-President of the National Association, was unveiled and presented to him. His colleagues on the Board of Directors of the Philadelphia Exchange also presented him with a magnificent gold watch and chain. He responded fittingly to each presentation.

After the "feed," which was most bounteous, followed a real "feast of reason and flow of soul" which lasted till the "wee small hours."

TO THE BRICK YARD.

The Peerless Brick Company having invited all who were interested to visit their extensive works, about two hundred went out Friday morning on a special

train provided for the occasion and were shown through the works by the officers of the company, who presented each visitor with a pretty souvenir in the form of an 8-page pamphlet containing a bird's eye view of the works and a cut of a handsome fireplace constructed of their brick, both of which we hope to present to our readers in the next issue of the Clay-Worker with a full description of the plant. They also surprised their visitors with an appetizing lunch which was heartily appreciated of which fact they had ocular demonstration.

A PLEASANT EVENING

Was spent with the Philadelphia Brick-makers' Association, they having requested those of us who were interested in the National Brick Manufacturers' Association to meet with them in their hall, Wednesday, February 13th. The presence of our colleagues, D. V. Purington, Chicago, C. P. Merwin, Berlin, Conn., J. C. Adams, Indianapolis, and Geo. W. Sharer, Terre Haute, Ind., all of whom were called on for speeches and responded cheerily, made the occasion a pleasant reminder of the memorable days spent in Memphis.

There was also present several craftsmen from Baltimore and other points.

The Secretary, Mr. W. F. Miller, read the minutes of the previous meeting when it had been decided that they (the Philadelphia Brickmakers' Association) join the National Brick Manufacturers' Association in a body and to extend a cordial invitation to the latter to hold their fourth annual convention in Philadelphia, December 10th, 11th and 12th, 1889. In as much as a large majority of the members in the National Association at their last meeting expressed a desire to hold the next meeting in the East, it is safe to predict that the invitation will be accepted.

After the transaction of some routine business the convention adjourned and the guests donned their overcoats and prepared to say good bye, but to their surprise were conducted to an adjoining room where a pleasant sight met their gaze.

WINED AND DENIED.

A sumptuous supper had been prepared and we were bid to partake thereof generously. It soon developed into an elegant "tea party." Their large hearted President, Sam'l Huhn, presided and in his own peculiar style called out Brothers McAvoy, Gillespie, Webster, Dobbins, Dowler, Flood, and others, who expressed their "sentiments" in a manner that

convinced their guests that the Philadelphia brickmakers are "*all right*." They know their business and if they are a little slow they are not tongue-tied in the least and are one and all "jolly good fellows."

AT BALTIMORE

We had the pleasure of meeting W. H. Perot & Son and visited their brick yard and terra cotta works. The former was not in operation but we made a hurried trip through it glancing at the piles of fine pressed and ornamental brick in the sheds as we passed. They make by the soft mud process, using a Newell Mill to grind the clay and two Martin machines. Dry artificially with Sharer's tunnel system, with which they are well pleased, and burn in open top kilns. In the terra cotta works we found them busily at work turning out ware that made us stare. Their clay is so fine and so well adapted to this work that they are able to mould and burn immense pieces weighing hundreds of pounds without the least trouble and that too with the clay just as it comes from the bank without the least admixture of any other material or clay; something we have not seen done before.

They are making excellent ware for which there is a large and increasing demand.

No other yards were in operation here, so we turn our steps homeward stopping

AT PITTSBURGH

Long enough to renew old acquaintances and make some new ones among the craft. We are especially indebted to Mr. A. A. Hersperger, of the Wittmer Brick Co., for many courtesies and also to our friend, D. C. Cawley, who will be remembered pleasantly by all who attended the National convention at Chicago. In this vicinity natural gas is used exclusively for burning and with good results. Unfortunately the supply of gas is controlled by corporations and the price has been put up till it is more expensive than coal but the advantages in the saving of labor justify its use.

Throughout the East we found every indication of material prosperity and growth, and in all clay work especially there is a fine prospect for an unusually busy season.

Those who are experiencing difficulty in burning brick with natural gas may find a hint as to the cause of their trouble in Dr. Brown's paper on another page. We are inclined to attribute the difficulty to the intensity of the heat engendered

with the gas which causes the difference in color. This may be regulated by reducing the pressure or volume of gas entering the kiln.

THE PAVING BRICK INTEREST.

At Lincoln, Nebraska, the interest in paving streets with brick is at fever heat. The city has contracted for the laying of 17,000,000 of pavers which will aggregate about seven miles of streets. The Vitrified Paving and Prepared Brick Co., of Lincoln, has contracted to make the brick and construct the paving. Besides this contract other contractors are making preparation to manufacture pavers as well as common brick.

The above company has put in two Penfield Mills, crushers, elevators, etc., and have also constructed Penfield Dryers having a drying capacity of 80,000 brick in twenty-four hours.

The company have erected five Eudaly Kilns each holding 240,000. The entire plant when fully complete will cost near \$100,000.

The company have already made several kilns of brick, and the quality so far as we can judge is excellent. The burn from top to bottom and in all parts of the kiln is certainly as good as could well be desired. The brick are so hard that it is difficult to break them by striking them together. They have the appearance of being glazed, and they are generally perfect in form. The company have an abundance of clay.

AT DES MOINES, IA.,

The city council have already favorably considered the use of brick in paving the streets in that city. They have already laid a half mile or more, and have ordered the paving of ten miles of streets if the brick can be had. At the time of our visit (Feb'y 6th and 7th) several parties were present in the city considering the expediency of investing capital in brick plants near that city. We were informed before leaving that one company had effected an organization.

The general interest manifested in this branch of the clay working industry is commanding the attention of all classes of people. People in these states are beginning to talk about paving public highways with brick. It is suggested that the travel-way can be paved a width of eighteen feet and answer every purpose, making a good highway for travel for all seasons of the year at a reasonable expense. Indeed, the use of brick for paving public highways will be thought feasible at no distant day.

EDITORIAL NOTES and CLIPPINGS.

M. F. Wharton is thinking of starting a brick yard at Troy, Ky.

Puyallup, W. T., is to have a brick and tile factory.

Page Bros. will start a brick yard at Gordonsville, Tenn.

C. S. Dean, may start a brick yard at Nicholasville, Ky.

Holt & Hill will start a brick yard at Montezuma, Ga.

Turpenning & Bunds will make brick at Prairie Grove, Ala.

Bryant & Shackelford will build brick and tile works at Water Valley, Miss.

Robert Melcher is to start a pottery at Weatherford, Tex.

The Carrollton (Ohio) Fire Clay Co. has been incorporated.

J. W. Grissard will start a brick yard at Winchester, Tenn.

A. J. Douglass, Covington, Tenn., will build tile works.

Milton Park writes that he is thinking of going into the manufacture of brick at Greenville, Ala.

A new firm with capital of \$50,000 has been organized at Pueblo, Colo., to manufacture Brick, Tile, etc.

It is reported that a valuable bed of fine fire clay has been discovered near Franklin, N. Y.

The Anna River Brick Co., of Detroit, Mich., have increased their capital stock to \$40,000.

The Table Rock (Neb) Clay Co. has been organized and will start a brick yard.

R. Ranken is starting a small Terra Cotta plant at Lansingburgh, near Troy, N. Y.

Linley, Wright & Co. will operate an extensive brick yard at East Brookfield, Mass.

Charles H. Price, Jr., and John S. Horton, of Mecham's River, will start a brick yard at Riverside, Va.

Read the "For Sale, Wanted, Etc." columns for experienced help, situations, second hand machinery, etc.

F. W. Pusey's Tile Factory, north of Shelbyville, Ind., was burned recently. Loss \$800. No insurance.

The Koch Hydraulic Brick Machine Co. of East St. Louis, Ill., has been incorporated, capital stock \$250,000.

It is reported that a company is being organized at Trinidad, Col., to erect a large brick plant there.

The Webster City (Ia.) Brick & Tile Co., has been incorporated. Capital \$50,000.

Chas. H. Dunn, Eau Claire, Wis., has purchased clay lands and will start a fire brick factory near Birmingham, Ala.

A subscriber at Worcester, Mass., Mr. H. A. Cook, writes that he has invented

a process by which he produces good brick without clay and without burning. We wait anxiously for full particulars.

The Helena (Ark.) Brick and Mfg Co. has been incorporated, capital stock \$25,000. H. S. Horner is president.

Roswell H. Howard, one of the oldest brickmakers in Massachusetts, died recently at his home in East Amherst.

P. S. Wentzel and W. W. Johnson contemplate establishing Fire Brick and Sewer Pipe Works at Weatherford, Tex.

J. & T. Gillespie had a fire at their yards near Philadelphia recently, doing about \$1,000 damage.

The brick yards of L. E. Jarden & Co., near Philadelphia, were partially destroyed by fire recently; loss, \$6,000.

Britt, Ia., is thought to offer advantages for the location of a tile factory. For particulars write to Mr. F. B. Rogers.

The Indianapolis Pottery was burned recently; loss, \$18,000; insurance, \$9,000. The works will probably be rebuilt at once.

The Union Brick Co., of Chicago, are putting in another Chamber's machine, and two of Penfield's compound roll crushers.

The Peerless Brick Co., of Chicago, has been incorporated by E. V. Johnson, A. G. Guffin and W. W. Ramsey, capital \$50,000.

N. Crutchfield & Co., of Maiden Rock, Wis., are opening up a new yard with a capacity of 35 M. per day. Will use a Penfield New Soft Mud Machine.

The Western Tile Co., of East St. Louis, Ill., has been incorporated by H. K. Givens, J. W. Harrison and John M. Reynolds. Capital \$60,000.

The Washington Brick & Lime Co., of Spokane Falls, W. T., are running a brick yard near that city with daily capacity of 70,000 brick.

The Eureka Brick Machine Mfg Co. have out a new four page circular treating on the manufacture of brick by the dry press process. Send for one.

N. Lemaire, a laborer in Shepherd's Brick Yard, near Montreal, Canada, was crushed to death by the caving in of the clay bank in which he was at work.

Pike & Castle's extensive tile factory at Chenoa, Ill., was burned recently. Loss \$15,000. Insurance \$5,500. The factory, which was one of the best in the "sucker" state, will be rebuilt at once.

Charles G. Noel and others are to start a small Brick Yard at Williamansett on the "Connecticut River R. R." and will supply part of the Springfield and Holyoke (Mass.) trade.

We are indebted to the Tiffany Pressed Brick Co., 161 La Salle St., Chicago, for a copy of their hand book and price list of ornamental brick which they manufacture in almost endless variety of designs and forms. This little book is of

special value to architects and builders, to whom a copy will be sent free.

The Bay City (Mich) Brick and Terra Cotta Co., will make a specialty of brick for street paving, having demonstrated that their clay is superior for that purpose.

The Wage Committee of Clay Assembly No. 6789, K. of L., have made a demand on the boss brickmakers of Philadelphia, for an increase in journeymens' wages of 10 per cent. over last year's schedule.

The Avery Stamping Co., of Cleveland, O., manufacturers of the celebrated Avery steel elevator buckets publish some flattering testimonial letters from parties who have used their buckets. Write them for circulars.

Mr. C. W. Edmunds, of Memphis, Tenn., in renewing his subscription writes that the brick trade there has been good all winter. They have had no severe weather at all and building has gone on without interruption.

Salmen Bros., of Slidell, La., will put in an Iron Clad Dryer. They burn in Morrison Kilns. The last one they built is thirty feet wide, and burns this width as well as 25 feet. They sell most of their product at New Orleans.

The plant of the Riverside Brick Company at Rush Run, Ohio, will be sold by the assignee about April 1. This concern has been very unfortunate, having once before been closed on a sheriff's execution.

The Columbus (O.) Brick and Terra Cotta Co., are enlarging their fire brick plant at Union Furnace, by adding improved machinery, and are building two more Eudaly Kilns to burn their fire brick. They have an excellent fire clay.

E. Harland, of Chicago, will in a few days begin operations on his Indiana yard, using a Penfield No. 20 Brick Machine, Pug Mill, and Conical Corrugated Crusher. He expects to be able to turn out 80 M. brick per day on this yard.

The extensive brick works of Dehaynin, near Marchiennes, La., were burned Feb. 27th. The flames spread to ten reservoirs of tar, each reservoir containing 100,000 gallons, all of which, with a number of barges in the river, were consumed.

The "Grand Automatic" folks of Cincinnati have sold complete plants to B. F. Orten, Philadelphia; Buffalo (N. Y.) Star Brick Co.; Higginsville (Mo.) Brick Co., two plants; Leach and Ash, Kokomo, Ind; Michael Adams, Baltimore, Md; Turner's Falls (Mass) Brick Co.; Higginsville (Mo.) Brick Tile Co.; Eggers & Brock, S. Omaha, Neb; I. H. Souther, Ripley, Tenn.; R. Watts, Missoula, Mont; Fox Bros., Springfield, Mass, and Pugging machinery to W. W. Parry, Rome, N. Y., and Holman Bros., Sargent's Bluff, Ia.

Mention the Clay-Worker

When writing to Advertisers

Mention the Clay-Worker.

The Frey-Sheckler Co., of Bucyrus, O., advise us that they now offer the trade an automatic self loading attachment for wire cut brick machines that places the brick on the truck. They are also making a mammoth double machine of the Acme pattern, having a daily capacity of 80,000.

Wm. Jackson & Son, of Duquoin, Ill., write that they have been burning in the old-fashioned way with wood, but have decided to build new Wingard or similar kilns, and add "We have been readers of your valuable paper for several years and think it is just the paper for all interested in the clay business. We would not do without it for many times the subscription price."

The Eureka Brick Machine Mfg. Co., of St. Louis, Mo., report more orders received than ever before, this early in the season. The St. Louis Iron and Machine Works is building twelve of these mammoth machines. The Eureka Co. last season was unable to fill orders for these machines as fast as sales were made. Parties starting brick yards, or wanting new machinery, should investigate the "New Eureka."

Last season was the best financially for "Brick Makers in Springfield, Mass. known for a good many years, brick averaging \$7.50 per M. put aboard cars ready for shipment. There were more buildings erected in Springfield last season (or 1888) than in any former year and local papers report a great number of buildings under construction. Harvey Weyant is going to put another machine on his yard which will make three machines to run in his yard next season.

The Atlanta Rubber Co., Atlanta, Ga., will hereafter look after the interests of the New York Belting and Packing Co., in the Southeast. They will carry a very large stock and a complete assortment of their vulcanized rubber goods. The New York Belting and Packing Company is to be congratulated in securing the services of this firm, as the New South is fast developing its manufactures and will constantly demand more and better supplies of this kind, and no one is in a better position to advance their interests in this territory than the Atlanta Rubber Company.

The Kansas City Gravel and Tile Co., have just placed a No. 4 Perfection Brick Press in their works to facilitate the manufacture of large paving blocks and tile. The No. 4 was made to their special order by Messrs. C. W. Raymond &

Co., Dayton, O. It is a powerful press with great pressing strength and rapidity of motion. The probable weight is 2,500 lbs., estimated pressure 30 tons, capacity of 6 to 7,000 blocks per day. One is also being built we understand for the Graham Patent Artificial Stone Co. Limited, of New Orleans, La.

Mr. Jno. R. Elder, of this city, is organizing a company to manufacture the Donaldson Clay Shingle, a description of which has been given in a previous number of this journal. The company will be capitalized at \$25,000 and propose to engage in this important industry on an extensive scale. Their factory will be located near this city and the clay shipped from an adjoining county over the I. D. & W. Railroad, where there is an unlimited quantity almost of the finest clays of all kinds.

R. B. Morrison & Co., of Rome, Ga., proprietors of Morrison's Improved Kiln, report that their present trade in kilns as well as the future outlook is better than at any other time since their kilns have been introduced in the market. The following firms have purchased rights and some are erecting, others will erect as soon as weather will permit, a full set of Morrison's Kilns: I. C. Wheeler, of Carthage, Mo.; Connett Bros., of St. Joseph, Mo.; The Perkiman Brick Co., of Norristown Penn.; A. T. Keely, of Royer's Ford, Penn.; South Baltimore Brick Co., of

Baltimore, Md.; W. C. Green Brick Co., Wichita, Kan.; Knoxville Brick Co., of Knoxville, Tenn.; Tallahassee Brick Co., of Tallahassee, Fla. Mr. John B. Morrison represents this firm in the Southwest and is meeting with success, among the brickmakers in that section.

The Lion Pressed Brick Co., of St. Louis, Mo., has been organized. They will use the Lion Brick Press made by the St. Louis Iron & Machine Works, a cut of which may be seen on page 146.

The brick interests at Cleveland, O., are very promising. There are 40 yards with an average capacity of two million brick each. At present the price of good brick is \$7 a thousand. Many new buildings are planned and a lively boom is expected.

The Corning Brick Co., of St. Paul, are very busy and crowded with orders for their Hollow Brick. Have not shut down a single day for ten months and have orders to keep them running for several months yet. They are using a Penfield No. 10 Machine and Pug Mill which seems especially adapted to their work.

Adam J. Weckler one of the oldest and largest Brick Makers of Chicago is largely increasing his facilities for 1889 by putting in one of Penfield's No. 20 machines, granulator, pug mill, and corrugated clay crusher. His capacity for 1889 will be 250 M. per day.

The Link Belt Machinery Co.,

New York, }
Minneapolis. }

CHICAGO, ILL.,
11 to 23 South Jefferson St.

BURR & DODGE,
Philadelphia.

M A K E

ENDLESS TROUGH CONVEYORS,

Adapted to handling (on incline) clay direct from clay-bank, or pit.

METALLIC APRON CONVEYORS,

(Sometimes called clay elevators). Adapted to feed Brick or Tile Machines.

TILE ELEVATORS, (New Pattern),

Will elevate any size up to 18-inch. Send for Prices.

LINK BELT ELEVATORS (using buckets),

Will elevate Semi-Dry or Pulverized clay.

We are prepared to contract for the entire machinery required for a Complete Brick or Tile Works of any capacity.

Send for 1888 Catalogue.

(Mention the Clay-Worker.)

A. Potts & Co. of this city are having a busy season. They have recently booked orders for one horizontal brick machine for St. Paul, Minn., and one for New Jersey, four mould sanders to Helena, Montana, two to Portland, Oregon, one to Memphis, Tenn., and one to St. Paul. They are also shipping a large number of their disintegrators, five going recently to one firm at Atlanta, Ga.

We have received a copy of D. J. C. Arnold's new catalogue of Brickmakers' Supplies, including Brick Moulds, both hand and machine, Tempering Wheels, Pallets, Barrows and Trucks of all kinds, Kiln Doors, Etc., Etc. It is neat and tastefully arranged and should find a place in the office of every brick yard. Send for a copy, addressing D. J. C. Arnold, New London, O.

The Eureka Brick Machine M'fg Co., of St. Louis write us that the Eureka is still growing in favor and that their trade is increasing handsomely. Their orders are ahead of any previous year, and they are much gratified with the prospects of a prosperous season. They invite brickmakers visiting St. Louis to call on them at their new quarters in the Laclede Building.

THE Jos. J. Kulage Press Brick Machines

Patented
1884,
1886,
1888.

Yield **DOUBLE** the Pressure of any other Brick Press (excepting the "Hydraulic") and are marvels of perfection.

➔ A NEW ERA IN MAKING PRESS BRICK. ➔

EVERY BRICK MANUFACTURER who intends or is making "Dry" or "Semi-Dry" Pressed Brick neglects his interests, if he fails to visit or correspond with the undersigned in regards to his system and machines. Works in operation day and night, all year (excepting December and January). Capacity: Daily 140,000 Bricks.

Our Fancy, Front and Stock Bricks are the only DRY-PRESSED Bricks made in the United States that are equal and SUPERIOR to those of the St. Louis "Hydraulic". We want a reliable Representative for the sale of our bricks in every large city.

JOS. J. KULAGE, President

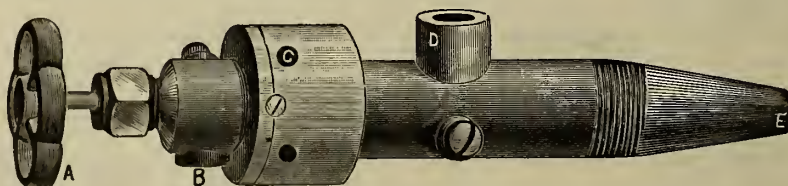
College Hill Press Brick Works,

WORKS, near O'Fallon Park St. Louis, Mo.

OFFICE, 1435 College Avenue, ST. LOUIS.

"A Dollar Saved is a Dollar Earned."

The latest development in the economical use of fuel for burning Brick, Tile, Terra Cotta, Sewer Pipe, Pottery, and for every other purpose requiring heat or steam.



REID OIL BURNER CO.,

Patentees and Manufacturers of

REID HYDRO-CARBON OIL BURNER.

158 PUBLIC SQUARE,

Cleveland, Ohio.

GEORGE BURNHAM & SONS' BRICK WORKS, }
MILWAUKEE, WIS. }

J. B. LEGNARD, BRICK MANUFACTURERS, }
CHICAGO, ILL. }

Reid Oil Burner Co.:

Yours of the 13th inst. received in regard to the Reid Burner. We have tried the different make of oil burners offered on the market in our section, and can safely recommend the Reid as being the most suitable for burning brick that we have tried. We will have the fifty burners we purchased of you in operation next week, in burning the fourth kiln we have tried with your burner.

Yours respectfully,

GEORGE BURNHAM & SONS.

Reid Oil Burner Co.:

Enclosed please find check on account burners. I have been experimenting with oil for the past three months and during that time have used two other makes of burners, and have decided to adopt yours. My arrangement with you was to take forty burners if the twenty which I have proved satisfactory. Please send the other twenty at once.

Very truly yours,

J. B. LEGNARD.

SEND FOR CATALOGUE.

E. E. BILLOW, Agent, Room 64 Rookery Building, CHICAGO.

JOSEPH REID, Agent and Manufacturer, OIL CITY, PA.

THE AERATED FUEL COMPANY'S SYSTEM.

[Patented in the U. S. and in Foreign Countries].

POTTERY, BRICK AND LIME BURNING BY PETROLEUM AIR BLAST.

The only Rival of Natural Gas. Cheaper than Coal or Wood.

A fire can be maintained indefinitely at a low heat, or increased to any required degree by merely turning a stop-cock.

OUR SYSTEM CAN BE ADAPTED TO KILNS NOW IN USE. No expensive plant needed. Do NOT CONFOUND THIS SYSTEM WITH ANY OF THE STEAM JET OIL BURNERS. The Insurance Companies approve our system. Nothing but air and Lima crude oil used in the fire.

W. S. COLLINS,

Sole Licensee for Middle Atlantic States,

171 Broadway, NEW YORK.

[Mention the Clay-Worker.]

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Upright and Horizontal,

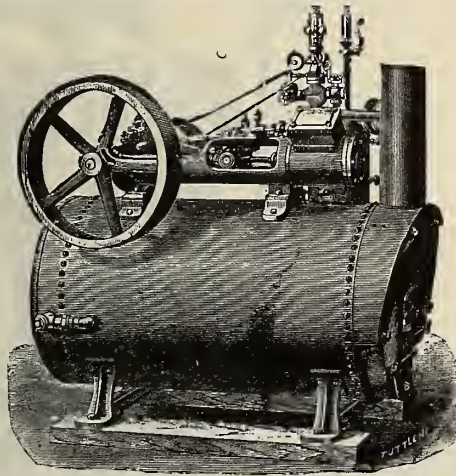
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All sizes, from Three to Twenty-six Horse-Power. Compact, Substantial, Economical and Easily managed. Guaranteed to Work Well and give the Full Power Claimed. Over 4,000 in Successful Operation. Not One Ever Exploded. No Engine Built so Well and so Low in Price. Illustrated Pamphlet Free. Address,

JAMES LEFFEL & CO.,

Springfield, Ohio,

Or No. 110 Liberty St., New York City.



Main Belting Co.,

Manufacturers of the Celebrated

Leviathan Belting!

WHICH FOR

Strength and Traction Power

HAS NO EQUAL.

Specially adapted for Brick and Tile Machinery.

Unaffected by Heat, Steam or Dampness.

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Samples sent on application.

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248 Randolph Street,

CHICAGO, ILLS.

NOTE—To any responsible party sending us measures, we will ship a "Leviathan" Belt on sixty days trial; to be paid for if satisfactory.

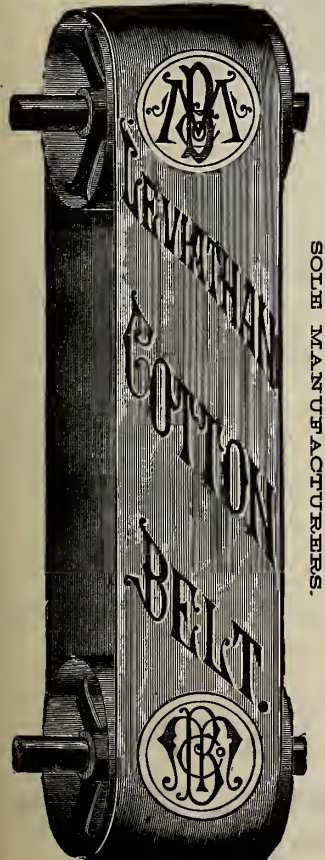
NEW ADVERTISEMENTS.

- Davidson Steam Pump Co.,
Pumps and Boilers.
- Grand Automatic Brick Mach. Mfg. Co.,
Brick Machinery.
- Chambers Bros. Co.,
Brick Yard Supplies.
- Wallace Manufacturing Co.,
Clay Working Machinery.
- Jonathan Creagers' Sons,
Brick Machinery.
- The Frey, Sheckler Co.,
Brick and Tile Machinery.
- Tiffin Agricultural Works,
Brick Machinery.
- Newell Universal Mill Co.,
Clay Pulverizers.
- J. W. Penfield & Son,
Clay Working Machinery.
- D. J. C. Arnold,
New London, Ohio.
- W. B. Mershon & Co.,
Brick Pallets, Etc.
- Michigan Brick & Tile Machine Co.,
Brick and Tile Machinery.
- William Thaison,
Brick Press.
- Jas. Leffel & Co.,
Steam Engines.
- W. S. Collins,
Aerated Fuel System.
- J. J. Kulage,
Press Brick Machine.
- Reid Oil Burner Co.,
Oil Burner.
- Small Ads., Wanted, For Sale, Etc.

NEW INVENTIONS.

The following is a list of patents appertaining to brick, tile, terra cotta, sewer pipe, pottery, etc., and the machinery used in their manufacture issued since our last number: (A copy of any of them can be obtained by sending 25 cents, the official price, to Chas. E. Brock, Patent Attorney, 925 F St. Washington, D. C.)

- 397,247. Mold Sanding Machine—C. Potts, Indianapolis, Ind.
- 397,665. Brick Kiln—Shakespeare & Rose, Chester, Penn.
- 397,604. Brick Machine—J. Morhand, San Francisco, Cal.
- 397,730. Hydraulic Brick Machine—J. Koch, St. Louis, Mo.
- 397,660. Brick Press—J. H. Steele, Butte City, Montana Ter.
- 397,642. Kiln for Firing Decorated China, Etc.—F. E. Hall, Catskill, N. Y.
- 397,770. Tile Machine—H. Z. Young, Seville, Fla.
- 398,134. Brick Machine—C. & E. Doerfler, Springfield, Ill.
- 398,055. Pavement—J. Kuoche, San Jose, Cal.
- 397,997. Tile Ditching Machine—R. E. Nevin, Enon Valley, Penn.
- 390,568. Molding Machine—J. Baker, Andover, N. H.
- 398,373. Machine for Tempering Clay—J. & M. Bierline, Chaska, Minn.
- 398,704. Molding Machine—T. A. Considine, Chicago, Ill.
- 398,730. Glass Tile—Izard & Stange, Glassborough, N. J.
- 398,420. Paving Composition—McCaughy, Sioux City, Ia.



SOLE MANUFACTURERS.

A FINE PICTURE.

Our sanctum is now decorated with a handsome chromo, illustrating a chariot race as conducted by the Romans of old. Those who have read "Ben Hur" and enjoyed the thrilling description of a similar scene will be especially pleased with it. A copy may be secured by any of our readers free by addressing J. W. Penfield & Son, Willoughby, Ohio.

OHIO TILE, BRICK AND DRAINAGE ASSOCIATION.

The Ohio Tile, Brick and Drainage Association held their annual meeting at Columbus, February 12th and 13th. The attendance was as good as at former meetings and a lively interest manifested in clay working. The sales of tile have been much better in the past two or three months and the outlook is considered good. There are a few exceptions and always will be, we suppose. But the general trade is improving.

The brick interest the past year has been lively, demand good and prices very satisfactory. Many tile manufacturers have gone into the brick business as well. They express themselves as much pleased in uniting the two.

The cutting in prices in the sale of tile has had the effect to discourage the output, and many factories are cutting down the output to meet the demands of the trade, only, at fair prices.

It was quite apparent that there is a stiffening of the spinal column in the way of a determination to sell only at remunerative prices.

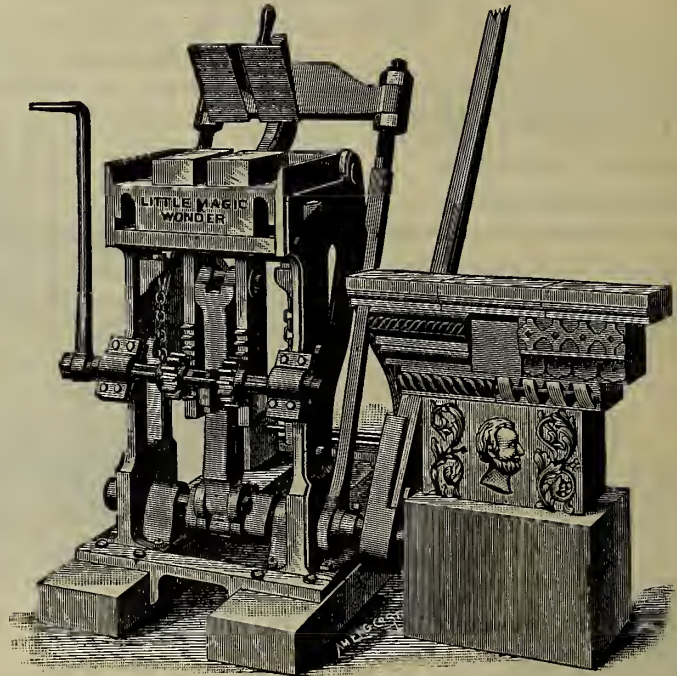
The use of brick for street paving received a full share of consideration, and was highly commended. Several cities in this state have been putting down miles of brick pavement and after several years of wear find it very satisfactory indeed. So that we confidently predict that it is the pavement of the future in that country.

The officers elect for the ensuing year are: President, W. A. Endaly, Cincinnati; Vice-President, R. E. Farnham, Richfield; Secretary, D. C. Postle, Galloway; Treasurer, S. E. Hagy, Etta, O. Programme Committee: D. C. Postle, S. E. Hagy, and Mr. Horlocker.

S. A. Yeargin, of Ousley, Ga., thinks there is a fine opening in his neighborhood for the establishment of a brick and tile plant. He writes that there is an abundance of excellent clay and that a good business can be established. Write him for particulars.

THE LITTLE MAGIC WONDER.**It Will Do It!**

OVER 1,000 DIFFERENT PATTERNS OF ORNAMENTAL BRICKS CAN BE MADE ON THIS WONDERFUL PRESS.

**Hear What a Prominent Brickmaker Says:***Mr. Wm. Thaison, Austin, Texas:*

St. Louis, Feb. 3d, 1889.

DEAR SIR—At the end of a fair and satisfactory trial of your Little Magic Wonder Dry Clay Hand Brick Press, it affords me great pleasure to testify to its efficiency for the purpose intended. I had long been looking for just such a Press, whereon at short notice and at very slight expense we could, within a few hours' time get out small orders for ornamental bricks of special designs and patterns without interfering with the operation and working of our regular machines. The great value of your Hand Press to me, lies in the fact that we can make bricks upon it by pressure on edge as well as flat wise, thus enabling one to make almost any conceivable design of fancy moulded ornamental bricks. As you let your machines go out on trial there can come no loss to parties intending to purchase. Very Respectfully, ANTHONY ITTNER.

Mr. Ittner runs two of these machines. His reputation as a gentleman and an expert brickmaker is so well and favorably known to the readers of the Clay-Worker that further comment is unnecessary.

Address

WM. THAI SON,
Austin, Texas.

Catalogues will be sent only upon mention of this paper.

THE CLAY-WORKER

VOL. XI.

INDIANAPOLIS, IND., APRIL, 1889.

No. 4.

Written for the Clay-Worker.

POTTERY.

No. 3.

It has often been urged in argument against our clay workers that they are deficient in art instinct and in capacity to produce ceramic work of superior excellence. It is true our work falls short of the *chef de euvres* of European and Japanese ware, but the falt is not due to our workmen, many of whom, and the most, are men who learned their art in England, France or Germany. Two things are necessary for success in any line—materials and a market. The general rawness and lack of development in the natural resources of the country compel our workmen to labor under supreme difficulties in producing superior wares. But the greatest want lacking is a public disposition to patronize a superior home production even when, after extreme labor and expense, a superior product has been achieved.

True, the American Public is beginning to be discriminating. A culture is being engendered that demands feeding. But the culture has not yet gone so far that it has developed into a love of art for itself. As yet, it is but a love of luxury that reaches every market, that patronizes every art but that which would thrive on it's own soil. It will pay a fabulous price for a "peach blow" vase if made in Japan and bite at an American imitation which it is unable to detect if presented under a foreign name while it refuses true merit if placed honestly upon it's face. Is is a part of that genius for tuft hunting which is due to the *newaux richesse* element of our new population.

Our people, as a whole, are lacking in the conservative element among the wealthy that has by liberal patronage raised the wages of Germany, France and England to their perfection and whatever our people may do is rated second-class by buyers whose judgment is so weak that they must depend upon the "brands" of severes or potsdam for a grade of wares that without these brands would be viewed with supercilious askance; in fact, be neglected.

Perhaps it is of little use to question the sentiment. The culture and innate judgment must come before it can appreciate and patronize merit wherever it may be found. The men of America who will pay for a meritorius art produc-

favor of really inferior work that had nothing to recommend it but the prestige of the name of the foreign maker.

These are disagreeable facts but they will disappear with time. In fact, signs are multiplying that they are even now beginning to disappear, as here and there appears a spark of native judgment capable of knowing a good thing wherever or by whoever made.

The gist of the above remarks is apparent in the building trades which have appreciated to the fullest, the efforts of the terra cotta manufacturers to extend the list of artistic building materials. The result has shown that wherever effort was appreciated and patronized, it rapidly placed itself in the

front, either in design, or execution, or excellence of quality. The present taste for striking effects in the details of domestic architecture, which, by the way, is not so new but that we may pre-



tion no matter under what difficulties, it were produced are few, so few, indeed, that the American has no incentive for effort and must betake himself, perforce, for purposes of bread earning to the production of cheap wares for the middle and poorer classes. In so far as his environment has permitted, or his market justified, the American clay-worker has proven himself in every way the equal of American genius in any other pursuit.

Although the capacity of his clays are only in part developed, his goods wear well and more than that, have an artistic elegance of form that recommend and gain ready sale. He has produced work of the highest finish but was obliged to see it passed by almost in disdain in

yet it has come to stay, has caused a pleasing ambition for excellence among manufacturers until American designs in these materials now lead the world. Only strong designs composed of few, strong, expressive and deeply cut lines should be used for exterior decoration in terra cotta, because fine detail in ornamentation will not only be lost on account of the distance from which the piece must be viewed, but will lower the effect of the entire design. For interiors, however, the happiest effects of relief may be chosen, because here the piece is sufficiently near to the eye to enable the viewer to appreciate delicate or intricate detail. The masters of constructive art have never lost sight of these

radical differences. Thus Phidias, the master of Greek art, constructed the pictorial frieze of the Parthenon and the statue of Minerva that was enshrined in it. The former (now in the British Museum) seems on first view to be rough as if chopped out with an axe. But it did not so appear when in its place, 80 feet from the beholder. The very roughness added to its strength. But within, all the happiest art of this great artist was expended in the truest delicacies of expression, drapery and finish on the ivory Minerva.

The accompanying cut is a handsome model for an interior decoration. So, indeed, it would be for an exterior; but for the latter the design would need radical overhauling; much of the detail would be omitted, the forms brought much further out and the finish left undone or purposely overdone.

Geometrical models are, to our thinking, too much adhered to by our designers. They are, as a rule, unfit for panels. Floral panels that are just now the rage are, by themselves, inexpressive, and should be used only as adjuncts to a bolder design. Some life is necessary in all panel designs, whether it be a bull's head for the pediment of a brick stable, or an Apollo for a center piece of a mantel and this is happily illustrated in the cut—a design by one of the best artists of Florence, Italy, and a model that would grace any interior piece into which it could be placed.

Written for the Clay-Worker.

STRENGTH OF BRICK WORK AND OTHER QUALITIES.

BY PROF. R. C. CARPENTER.

The principal value of any material for building depends on two qualities, durability and strength. But other qualities subordinate in nature to those mentioned, often are of equal weight with builders; among these may be mentioned uniformity in texture and color, size and cheapness.

So far as the two principal qualities, durability and strength, are concerned, no material surpasses or even equals brick, but as regards the subordinate condition of uniformity, except as to size, many materials surpass brick. The only objection that can be charged against brick arises from the fact, of this lack of uniformity. You will find on the brick yard, and often from the same kiln, all qualities from a dry lump of clay to hard burned and perfect brick. I have often

wondered at just what point we could define the transformation from clay to brick. When a manufacturer I was willing to accept a liberal interpretation and never objected to supplying all the soft brick the market demanded. When acting as an inspector of building materials I have insisted on the use of hard brick unless the specifications permitted the use of other brick for inside walls. It is, I think, the common practice, certainly in most small cities, to use a great many soft brick in the inside walls; and I shall not condemn this practice because such brick, although not possessing great strength, are, as I will show later, amply strong for the load they are likely to have imposed upon them.

I have incidentally remarked that brick are durable, I mean by that not all brick but some brick. I think no material known will stand the effect of weather and time as well as brick, *i. e.*, some brick. You are all perhaps familiar with the effect of our climate on the granite obelisk, now standing in Central Park, New York, and that is probably effected no more than our best American granite. I venture to say that the hieroglyphics of that monument, change more in one year than lines or mouldings equally delicate would change in ten years on our best brick work in the same place.

So much for the durability of our best brick. What can we say of our poorest brick, it will hardly do to expose them over winter; the effect of moisture and frost will completely disintegrate them. Instead of being able to carry a load, if exposed to the weather, they will soon not support themselves. This great difference in the quality of brick, is really a serious objection to the use of brick, and makes it continually necessary to inspect brick and use every test in our power to separate the poor from the good. Now as to the strength of brick, there is fully as much difference in the strength as in the quality to withstand the weather, but I have always maintained that the strength is of little importance to the builder or brickmaker, for the reason that the poorest brick possesses a strength, much in excess of any load likely to be placed upon it, unless it is an index to the more important quality of durability.

What little I have done in the way of testing brick was with the idea of finding how the effect of certain methods of manufacture, using the same kind of clay, influenced the result, rather than to determine the strength of brick in gen-

eral. For this case, the reader cannot do better than to consult the able work of Prof. I. O. Baker, published by J. Wiley & Son, New York.

I have also taken particular pains to test the poorest brick that would be admitted to a building, selecting such brick myself in order to see what the actual standard of use was. I am free to confess that I have not completed this series of tests, and consequently I am not ready to report in detail. My results naturally are low, but seem so far to agree well, with the tests made by Collingwood of the common brick of New York.

I think I can state the only point of interest in this connection, that I have so far noticed in these tests, and that is that the strength of the poorest brick tested, crushed when placed sideways between thin pine boards, at about 600 lbs. per square inch. These brick were soft and pale, and as poor as would be admitted in any building. Rankine in his Civil Engineering places the softest brick as low as 300 pounds per square inch, but I have found no brick as weak as that.

BRICKWORK.

The mortar, which must invariably be used with brick, varies in its strength and durability more than the brick itself. There is no doubt but that the best brick in the world laid with worthless mortar, would result in worthless brick work, so that to secure good brick work, the people are as much dependent on the builder as on the brickmaker. The best mortar, unless quite old, very seldom exceeds in strength the poorest bricks that would be admitted to a building. Yet, nevertheless, strong brick with weak mortar will make a stronger column, to sustain a crushing force than brick of the same strength as the mortar.

With selected bricks and excellent mortar, some very high results have been obtained, on the short columns that come within the capacity of the testing machine.

There is certainly no difficulty in securing a mortar that will stand a crushing force of 300 pounds per square inch, some in a few days after laying, so that the brick work ought certainly to exceed in strength, that of the brick mentioned by Professor Rankine.

Now then let us examine for a moment the sustaining power of the weakest brick tested by Rankine; 300 pounds per square inch is equivalent to 43,200 pounds per square foot, or nearly 22 tons. This would sustain a column of its own

material, weighing 125 pounds per cubic foot 345 feet high. Professor Rankine calculated that the greatest stress, coming on the brick work of a chimney at Glasgow, Scotland, 468 feet high, because of its expanded base did not even in a gale of wind exceed on the leeward side fifteen tons per square foot, a strain much less than the capacity of the poorest brick. I, myself, remember to have caused a number of worthy builders of our vicinity much anxiety, a number of years ago, because I placed a water tank, connected with our College water works, in the top of a tower 70 feet from the ground.

The walls of the tower for 30 feet below the tank were only twelve inches thick, and besides, were pierced in several places for doors and windows. The weight of the tank and contents at a maximum is about 60 tons. To carry this I inserted heavy beams of wrought iron, resting on plates of cast iron, inserted in the brick work. The tower was thoroughly tied together and supported from side vibration. The additional weight caused by this tank may have been at the tank eight tons per square foot, but was soon distributed throughout the whole mass of brick work and reduced to less than one ton per square foot.

To satisfy the fears of the anxious ones, I removed a half brick a few feet below the tank, and fitted a block of wood just so that it could be slipped in by hand when the tank was empty. I then filled the tank with water, and as I expected, there was no evidence whatever of settling which would have exhibited itself in tightening the block. I was thus able to satisfy all that the tower was safe.

It is my impression that if brick work has sufficient thickness and solidity to withstand the jars of moving loads and side strains tending to crowd it outward, there is little possibility of crushing it by any load that could be imposed in a building.

Another thing in favor of brick work; experiments show that it will commence to crack and splinter, with a load varying from one-third to two-thirds its breaking load, consequently it does not fail without warning and time sufficient at least, to save life could in all cases be had, if the warnings were heeded. This is an accident, however, that so far as I know has never happened.

I see that a fourteen story building in Chicago failed a few weeks ago; the first reports claimed the falling was due to

overloading the brick work, but later reports indicate a failure of interior metal work in the floor system and that the brick work remained intact. I have since learned that the walls were not injured and will not be taken down; so that the accident does not prove as an illustration of the effect of overloading brick.

This argument will no doubt raise the query in many minds as to the necessity of testing brick. My own idea is that the test of a brick may bring out other qualities more important than its power of resisting a crushing force. Thus, for instance, in a catalogue issued by Mr. Anthony Ittner, of St. Louis, Mo., I notice that his brick withstood a test of from 8,870 pounds per square inch to 12,780 pounds when tested in the ordinary flat position. Now, as this amount is about three times the strength of the best brick from this locality I believe that they also possess other superior qualities. The important point is rather the relation of strength to durability and other qualities, than the strength as an abstract amount. Indeed, if the strength alone is considered, we need to test not our best bricks but our poorest ones. The few tests that I made last year of brick manufactured from the same clay but by different processes, showed a decided superiority in favor of well tempered brick over those poorly tempered. In this case it happened to be hand-made and machine-made brick. In this particular case the strongest bricks did not ring as well, nor were they so hard as the other class, yet their durability was known to be superior when exposed to the weather. The relation in this case which existed in the strengths of the two kinds of brick also existed in other qualities of the bricks. I confess that I have no opinion as to what the final outcome will be in this method of testing if it can ever be completed. I would like the co-operation of such manufacturers as are interested, if they could send me prepaid a set of brick from their manufactory, with a statement of the method of manufacture of each kind sent, I would be glad to test them and will send them the results free of cost. I am especially anxious in regard to paving brick, as I predict a great future for this class of brick if they can be made tough, hard, durable and uniform.

I repeat that I do not desire to test a brick merely to find its strength. I would like to know the method of manufacture, the quality of the clay, and durability of the brick, if known.

Lansing, Mich., March 7, 1889.

Written for the Clay-Worker.

BRICKMAKING AND BURNING.

No. 1.

BY JNO. W. CRARY.

It is needless for me to say that brick-making is one of the oldest arts practiced by man, yet it has made less progress in its methods of operation than any other art. In this article I will notice the different kinds of clay that is, or may be, used in the manufacture of brick of all descriptions. (See Webster's definition of clay, which is right, except that he like all brickmakers, says that clay will shrink or "contract by heat," which is only true as a rule.) All clays partake of a metal called aluminum.

"Fire clay," such as is generally used to make infusible brick for furnaces, is composed of alumina and silex, with, more or less magnesia, and a trace of protoxide of iron, etc. In proportion as iron and alkaline salts are present in clay, in that proportion it is vitreous, or fusible; and in proportion to the absence of iron rust or sesqui or protoxide of iron and alkaline salts, it is infusible. All "fire clay" has more or less alumina, silex and magnesia. The most of our primitive clays in the South are infusible by ordinary heat of "the furnace." In some places I have found that a kiln set 45 to 48 bricks high, would swell up three inches when perfectly burned, instead of settling eight to ten inches, as in the case of fusible clays. The clay on my own yard here will perceptibly swell under intense heat; yet I can melt a brick made of it if I put two ounces of soda or potash with it before molding it.

The metallic oxides is what gives color to clay. Where iron rust, or oxides of iron predominates, we find that kind of clay that burns a bright cherry red. The alluvial clays of our rivers and creeks, and the anti-alluvial or delluvial clays of much of our "table land," are of this character. The "silt" or clay deposited on the banks of the Mississippi river is alluvial clay, and makes a dull red, friable brick, easily burned but fusible under a low heat. Most of the brick of commerce are made of the more primitive clays, or the anti-alluvial clays, such as are found on the plateau lands of our rivers. The red brick of Philadelphia, Baltimore, Cincinnati and St. Louis, for instance, are of this kind of clay. The largest, deepest, and most unbroken continuous bed of this kind of clay in the United States is to be found at Baton Rouge, La. It is over twenty miles wide, one hundred miles long, and generally

twenty-two feet deep. I have found this from personal observation and have made some of the finest red front brick of it that I ever saw. In fact, this mammoth clay bed is nearly continuous on the east bank of the table lands of the Mississippi River from Bayou Sara, La., to Memphis, Tenn., about 400 miles long and an average of twenty miles wide.

FIRE CLAY.

Our fire clay beds are of two distinct kinds of deposit, one is in veins or strata, conterminous with our coal fields; the other are the large homogenous primitive clay beds of New Jersey. South Carolina, Georgia, Florida and Alabama. All of these clay beds are found near, or contiguous to the sea-coast. The largest, most extensive and best are found in the southwest part of Florida and southeast part of Alabama. The Perdido river is about the center, running north and south. The best developed beds of "fire clay" are found in Escambia county, Fla. In fact, the whole country is underlaid with one vast interminable bed of potters and fire clay in strata from six to forty feet deep, often cropping out on the surface. This clay is suitable for all kinds of pottery, for "fire brick," and for the very best kind of building brick, or blocks for street paving, and is cheap, accessible, and in every way advantageously situated for profitable manufacturing.

HOW TO TEST CLAY FOR MAKING BRICK.

I have known many who got the "brick fever," or "brick in the hat," to start, and with plenty of money, to get rich on a poor bed of clay. The first work I ever did was to "turn up brick" on my father's brick yard in Cincinnati, Ohio. I went to "off-bearing" as soon as I could carry three brick in a mold; then I was put at a "table" as soon as I was strong enough to mold, and I learned to mold in all ways and all sorts of brick. I then was put to "setting" and in due time to "burning." We burned the old-fashioned way—closing up one "head," or side, and firing from the other about three days, then opening the closed head and shutting up the open one, then sliding wood over with the old slavish "home pole" until the first head was "settled," then reversing fires and going for the "middles" and "last head." Now, if you were an old sawn-worn, weather-beaten "mud lark," that knew how to roast a stolen chicken, you would know just what I am talking about, and seeing that I have been sixty-five years in brickyards you will say "he

must be a brick," and not a "samon" brick, at that.

When I started out for myself, I thought I knew all about brickmaking, and I got along first rate while working along on the Mississippi river where the clay was of the same kind I had been used to; I thought a brickmaker was a brickmaker, the world over. It happened that I left the Mississippi river and went to Little Rock, Ark., in 1838. I had an engagement to make brick there and I selected a clay bed which in all appearances was just the kind I had been used to. I soon had a kiln on fire, and the fires worked first rate. I was very much pleased; but when I came to "settle the heads" just as I had always done, the irritation began. There never was a more sleepless, vigilant man at a brick kiln than myself. I had the fires blooming out all over the top; the arches were nearly to a white heat, and hotter than I ever had a kiln before. I saw no signs of a "settle." I began to get scared; the idea that I had come there as a "crack, tip-top" brickmaker and now could not "settle" a brick kiln, when the fires and wood was all first rate, was too crushing for good temper, so I got several cords of the best dry, fine-split hickory wood and burned it as fast as I could throw it in, and keep up a rapid combustion. The "arches" were so hot I could not see the "overhangings;" they were as white as a snow bank. White blazes shot up all over the kiln and the walls cracked so that the whole kiln looked at night like a mass of molten matter, not a particle of "settle" appeared, and I closed the kiln as the greatest phenomenon of my life. I knew the kiln was burned, but the quality of the brick was what concerned me. On the fifth day after closing I opened the kiln, and, to my most agreeable surprise, the perfect uniformity, ring, strength and color of the entire kiln, excepting the outside course of brick, was the most perfect I had ever seen. Then it was that I saw the wisdom of Dr. Franklin's aphorism, "That sensible people never finish their education." I saw that stereotyped practice in brickmaking would only do in the clay bed where the practice was had, or one exactly similar, a thing only found on a continuous stratum in the same locality or kind of clay.

TESTING CLAYS FOR BRICKMAKING.

If a person desires to make brick, and has any concern as to the quality, he should first have some proper practical knowledge of the business. Then if he goes into a clay bed which is unlike that

he has worked, he should take a fair specimen of the clay and have it tested in some brick kiln where brick are well burned. If no such kiln is convenient take some of the clay and wet it, letting it soak over night, then divide the specimen and temper one-half well without adding any more water to it than was used to "soak it," mold it in the form of a small brick; then temper the remaining half in the same way, adding water to it once or twice or three times, so that it will become much more plastic than the first half, then mold it likewise and put both specimens in the sun to dry. If the clay has much lime or alkaline matter the sample tempered and watered most will crack in the sun and melt under a low heat, while the first specimen, watered and tempered only once, will not crack and will stand fire better than the other. Most people think that the more clay is tempered the less it will crack in drying, but the reverse is true. Clay is one of the most powerful hydrates known; it never parts with water until at nearly a fusible heat. Clay absorbs water in being tempered until disintegration is complete, hence it may be watered from three to five times during the process of tempering, and its toughness and plasticity increased every time water is added. If clay be "loamy" and weak it may be made stronger by repeated wetting and tempering. The analysis of clays shown in the books cannot be relied upon unless made from a fair specimen to be used. I will, in my next, give a simple way to make an appropriate test of clay without burning it; but nothing but a proper, fair, practical test, will tell the truth about clays. Practice and science are so closely and necessarily allied in clay-working that none but "botches" will dispute it.

MANUFACTURE OF PLAIN AND ORNAMENTAL PRESSED BRICK--HOLLOW BUILDING BLOCKS, ETC.

*BY R. C. PENFIELD.

Mr. President and Gentlemen of the Convention:

This subject to which we have been assigned comprises more than can be properly treated in a paper suitable to be read before this Association. We will therefore drop out the ornamental pressed brick portion and so much of the hollow building block part as should be treated from the stand point of hand

*Read before the Ohio Tile, Brick and Drainage Association.

made terra cotta and confine our remarks exclusively to such blocks as can be made on a dry moulding, stiff clay machine or press. Hollow building blocks is certainly a dry subject and it is doubtful whether we will be able to demonstrate that it has merit either from an economic or an artistic stand point, to give merit to our effort.

Is it not passing strange, if there is anything in it, that it has gone so long undeveloped, or is it one of the lost arts or useless arts? So far as we know the use of hollow building blocks for general building purposes has never been fully developed in this country. It is true at Cuyahoga Falls, buildings and foundations have been constructed of vitrified hollow blocks of a dark brown or stone ware glaze appearance, that gives one the impression at once of an old jail, and is a failure from an artistic stand point. The Pioneer Fire Proof Construction Company of Chicago, have an office built of that kind of material, that is a good effort in that direction and has more artistic merit. There may be other buildings in different portions of our country but the journals devoted to this art do not, and have not shown how hollow blocks of burned clay can be utilized for general building purposes. Our experience in their manufacture and in the construction of buildings connected with our manufacturing establishment has demonstrated the fact that blocks do not want to be made too large. The first building we constructed was made of blocks 8x8x12 inches, with only one partition through the centre of the block.

One difficulty with the size of this block is to make them long enough to give the proportion. A block ought to be made three times as long as it is thick to be any where near the relative proportion of a brick. This would require an eight inch block to be 24 inches long. Any one conversant with the manufacture of tile will readily concede the difficulty in making blocks that long and have them straight. The loss in the manufacture of blocks that size and length would be much more than smaller ones and more inconvenient to handle, both for the Masons as well as for the manufacturers. For general building purposes the blocks ought not to be more than 12 inches long on account of the openings and then the architects should space the openings with reference to the length of blocks as nearly as possible. We have established as a proper thick-

ness for a standard block 5 inches. This is equal to two courses of brick, and makes it convenient to make a bond where brick are required as in chimney breast, etc., etc. Having established the thickness, the relative length naturally follows. For proper proportion, the most pleasing effect will be had if this block is 15 inches long and it might be well for first class jobs to make the front blocks that length. This involves another difficulty and that is making the corner blocks. In every instance the corner blocks are made with what we call a side cut die and cutter, and as the ends of the blocks must be one half the length, this would require a block $7\frac{1}{2}$ wide by 15 in length. This is a large block to make, but it can be done with no particular trouble. The difficulty is in loss by the ordinary accidents of manufacture and the loss of one large block is greater than a small one and the liability to loss is greater with the large than with the small. The rule should be not to make blocks longer than 12 inches and then the corner block will have to be only six inches wide to make the bond correct. About three grades of blocks as to width will accommodate any building from a cheap cottage to a mansion. To commence with a cottage, we would make a block 5x8x12, corners 6x5x12, holes running vertical, side cut. A wall constructed of one course of these blocks would be equal in strength to an 8-inch brick wall, and the plaster can be placed on the hollow wall direct and save cost of lathing it, etc. Now the next combination for heavy or thicker walls, can be made by using in connection with these blocks, a block 4x5, and if it should be desirable to make an air space, these blocks can be made one or two inches apart, using the 4x5 for the inside courses, and alternating every six courses, putting the 8-inch block on the inside and the face block 4x5 for the front. This will make a 13 or 14 inch wall with an air space of 2 inches if desired, or a 12-inch wall without the air space, and in either case, a wall bound thoroughly and very strong. With these two sizes of blocks for stretchers, a number of combinations can be made. Should it be desirable to make a 16-inch wall, two courses of 8-inch blocks can be used and occasionally a 4-inch block used to tie courses. Four dies are all that are required to make any of these combinations. One for corners 6x12, this is a side cut die, with shell $1\frac{1}{2}$ or 2 inches thick, one for the window and door

jamb, 6x6, cut 5 inches long, same as corner blocks to correspond with the thickness of the stretcher. The walls of these blocks or shell should be 1-in. thick, more or less according to the quality and strength of the clay. The corners are side cut blocks and should have a shell as remarked above not less than an inch and a half in thickness because it is important to have a bed for mortar in raising the corners.

Now, gentlemen of the convention, you have a short but concise description of the coming building material of the country. If the details are followed and the mason work well done with the blocks as above described a cheap, durable, dry wall can be made that will far excel in beauty and cost an ordinary brick wall, but our theme is just begun. We have the subject only just blocked out. I have described only a plain smooth wall with no ornamentation, not even a round corner. When it comes to a question of art the field before us is limitless. Varieties of mouldings that can be made on the face of blocks for special use as water tables, belting courses; cornices, trimmings around the windows, etc., etc., are too extensive for more than mere mention in a paper of this kind. Also beaded work, either coarse or fine or the two combined in the same block, or what is called in stone work Crandall finish. These and numberless other kinds of finish furnish opportunities for the student of art to expend his best inventive skill in planning combinations for beautifying and ornamenting to a degree far beyond our present conception and will at the same time add but a trifle to the cost of constructing, beyond the use of just such a plain, smooth, simple block. The cost of a mould is small for the manufacture of either plain or ornamental blocks so that the manufacturer can afford, if he has to, almost any design at a trifling expense over a plain block. We have made no mention yet of the possibility of producing beautiful varieties for artistic affect, of the various combinations that can be made with brick or terra cotta work mixed in with the different varieties of building blocks, but will here remark for the benefit of those interested in the development of this material that we will be pleased to more fully explain or show samples of the work that we have in its present development, at any time you may choose to give us a call.

J. W. PENFIELD & SON.

Willoughby, Ohio.

Mirage.

We'll read that book, we'll sing that song,
But when? Oh, when the days are long;
When thoughts are free and voices clear;
Some happy time within the year—
The days troop by with noiseless tread,
The song unsung, the book unread.

We'll see that friend and make him feel
The weight of friendship true as steel;
Some flower of sympathy bestow—
But time sweeps on with steady flow,
Until with quick, reproachful tear,
We lay our flowers upon his bier.

And still we walk the desert sands,
And still with trifles fill our hands,
While ever just beyond our reach,
A fairer purpose shows to each.
The deeds we have not done, but willed,
Remain to haunt us—unfilled.

**THE MANUFACTURE OF MOLDED AND
ORNAMENTAL BRICKS BY THE
PEERLESS BRICK COMPANY.**

The progress that has been made of late years in the art of brickmaking is very marked indeed. In years past little attention was bestowed upon the charac-

We had the pleasure last year of spending a brief hour in these works examining the stock of pressed and ornamental brick in store and others in process of being loaded for shipment to various parts of the country. The line of goods manufactured at their works embrace plain, moulded and ornamental brick, which includes panels, mouldings, etc.

We herewith present our readers with an illustration of the Fireplace in their office, also an illustration of their works.

The daily output at this season of the year is about sixty thousand, divided as follows: Twenty thousand face or front brick, twenty-two thousand stretchers (a term used for second quality face brick), eight thousand moulded and ornamental bricks—the ballance of common bricks.

The following is their mode of making pressed bricks: A bar of clay of the re-

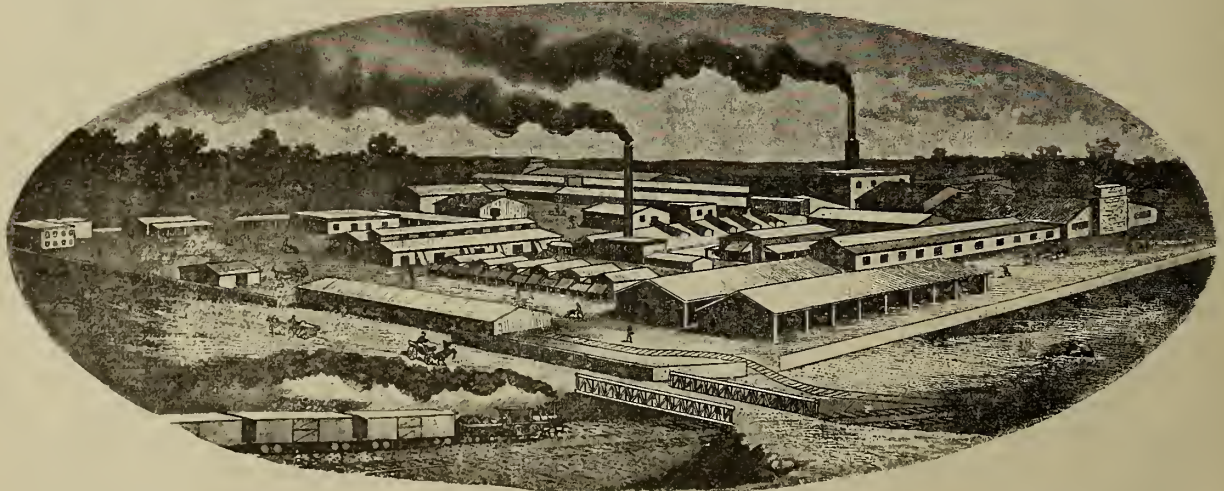
and run into drying tunnels.

DRYERS.

Imagine a room 50x100 feet and 4 feet high with tracks running through lengthwise with a space 15-in. deep underneath the tracks in which there is a 1½ in. steam pipe, say about 1500 feet of pipe which is fed with live steam at a pressure of 70 pounds. Each track of 100 feet will hold 12 cars, each car carrying 500 bricks. In the roof of the dryer over each car is an opening 8 in-square which allows the moisture to escape. About 30 hours are required to dry the clay in this way.

BURNING.

The Company have 7 Melcher Kilns of 250,000 capacity each. The floor of the kiln looks like a large grate made of fire bricks. On the grate or floor is set two or more courses of common bricks. On these are set pressed or moulded



Works of the Peerless Brick Co.

ter of brick used except the mere regulation size of the locality where they were to be used, and sufficient hardness. They might be rough and off in color to an extent that made the building have a motley appearance, but little or no objection was found to the brick on account of such defects. Durability and utility were the points of excellence. A few manufacturers have in the last few years announced the determination to elevate the art and they have been nobly assisted by the leading architects of the country. How far they have succeeded toward this end is shown in some of the more recent brick structures in the leading cities of the country. Notably in the lead in this rapid stride in the elevation of art is the Peerless Brick Co., of Philadelphia.

quired length and thickness for a brick say 8½ by 4½ is pressed from a machine; the bar is then cut by wire into bricks of 2½ thickness. These are hacked 500 on a car and run to a Cornell power press. The brick here are first dipped into fine sand and fed into the press. After being pressed they are hacked on pallets and stand twenty-four hours to partly dry, after which they are repressed by hand, set on cars and run into drying tunnels. The "stretchers" go through the same process except they are not repressed by hand. The "common" are cut at the machine and go directly to dryers. The "ornamental" brick are made by hand of tempered clay one at a time and laid in rows on a heated floor where they remain twenty-four hours, then pressed into the requisite shape, loaded on cars

bricks until within three courses of the top—the three top courses being common bricks and the latter are "salmons" when burned and about all the soft brick they get.

SIZES OF BRICK.

They manufacture the following sizes: pressed brick 8½x4½x2½, stretchers and common the same—8½x4½x2½. The pressed brick are made 2½ inches in thickness which is ½ thicker than the "common" or "stretchers" for the reason that the masons lay ½ joint in laying pressed brick and ¼ for common and stretchers which brings the work up bonded on the front walls without any broken work on the corners.

The Company gives special attention to the color of brick and have done much to popularize this feature in brick

manufacture. They are also adding from time to time new forms or designs in ornamentation and suggestive combinations.

An able English writer says: "Our buildings both outside and inside should have some of that warmth which color only can give. They should enable the educated eye to revel in bright tints of nature's own formation while to the uneducated eye, the best of all possible lessons and by familiarizing it with the proper combination of color and form would be enabled to appreciate it."

It is a pleasure to give space to those who are helping to educate to higher standards of excellence and beauty. The art of combining colors and designs of ornamentation so as to have a pleasing effect to the eye, contributes to the higher education of our taste and is every way elevating.

efficiency. There is more in the man, than in all the appliances. The pluck that braves failures and the energy that overcomes difficulties are the two pots of gold on which our business rests. The drone with us is a useless superfluity, and the average man who has fallen in the habit of experimenting and inventing, is beyond the hope of redemption. But system, order, economy and industry always guarantee success. Pinch yourselves once in a while to make sure that you are awake. A sleepy tilemaker, a lazy brickmaker, are some of nature's misplaced excrescences. You need to be stood on your head once in a while, turned inside out, purged of some of the old fossil oft-repeated ideas, and that is what I am after, but may not be able to accomplish. Look out for a storm in a tea-pot. Something that will keep your heads cool, from the effects of the heat

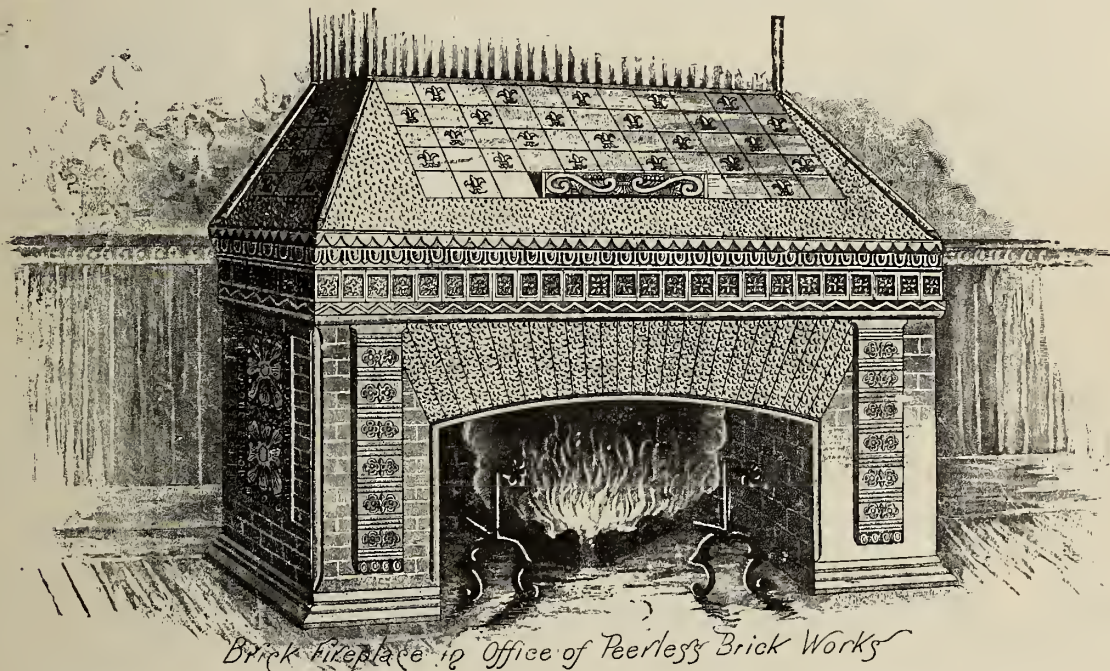
the change of the heat, must be injurious to its structure.

Mr. C wears out his belts by using rosin on them, instead of keeping them well oiled from the outside, and I am not so sure but what he runs them upside down.

Neighbor D puts up a new iron stack once every three or four years when he could make the brick for a stack that would last a century.

I wish you to understand that I am not a chronic fault finder, but I started out on this line and I am going to fight it out if it takes—all your good will. "Little strokes fell great oaks," and little mistakes eat up great fortunes, fortunes made out of clay banks.

Many tile yards and brick yards present the most disorderly, irregular, unsystematized, disagreeable spectacle in the neighborhood. Why so? Does the



Brick Fireplace in Office of Peerless Brick Works

VARIETIES.

*BY J. G. WAGNER, COVINGTON, O.

From a subject so vague, none will know what to expect, and no doubt it would be better if it were not only vague but were not at all.

We have so often heard of the best kilns, the best machines, and the best methods, but we never hear of the best man, the one most careful, faithful, watchful, given to looking around to see, not where he can blame the clay, the machinery, the kiln or the process, but to discover his own carelessness and in-

efficiency of the argument.

My neighbor A puts West Virginia oil ("black-strap," he calls it,) into his boiler. What for? To blow it up? As likely as not.

Mr. B has a solvent that effectually cleans his boiler, but alas, he is not aware that it will eat through the iron and compel him to buy a new one. It is cheaper to clean a boiler than to buy a new one. Boilers generally should be, not only washed out, but cleaned out once every two weeks. I must here enter my protest against blowing off boilers with any pressure whatever, for the rapid change from a pressure of 10 or 20 pounds to nothing and the cooling of the metal caused by

business bring the habit? Or the habit the business? Some tilemakers seem to have a place for everything, but they frequently forget where the place is.

It takes some of us a lifetime to learn how to arrange our works for economy and success. If your works are conveniently arranged, tile trucks are cheaper to use than wheelbarrows or cars and tracks, and much less in cost. The least investment with the best yield in quality and quantity for the lowest cost, is what we must strive for. A little sand, short clay, loam, saw or coal dust, may save you much loss and labor on your brick or tile, so may a little more regular burning and slower cooling. Perhaps your dry sheds have too much air in the start,

*Read before the Ohio, Tile, Brick and Drainage Association Feb. 12, 1889.

or not enough later. Perhaps you set your tile too green, or too close, too high or too uneven.

Now, for a little variation in our humdrum essays on old and often handled subjects. We have made the nearer acquaintance of the unmatched Colonel Sellers in order to find a scheme with millions in it.

We assert that the time will come when mountains like Stromboli and Cotapaxi will furnish from their ever issuing internal fires the fuel for smelting your metals, for burning your earthenware, yea, perhaps even for cooking your meals, and who knows but what the time will come, when, by holes bored through the outer crust of this earth to that vast immeasurable reservoir of internal fire, our larger cities will be supplied with heat and fuel. There is millions in it.

The attendance at our conventions has been waning, until even the machine men and the patent kiln men are no longer to be depended on. Not that the instruction given is no longer needed, but less appreciated; perhaps, too, it does not always reach the maximum in interest and value. The real reason, however, is that the number of beginners is growing less and that the profits are sensibly diminished by the low prices. It is evident that if this continues our attendance at association meetings will become so slim as to seriously endanger its very existence.

You will excuse me, then, if I suggest that in place of the several state associations, one National association might prove of more interest, in that it would have the whole country to select from, for its contributors, while in its peripatetic course over the country it would arouse interest in states and places where now its existence is neither known or felt. This association could then perhaps be advantageously divided; say, into brick department, drain tile department, pottery, sewer pipe, terra cotta and other departments. While in all pertaining to clay, its preparation and burning, all could participate in common. Such an association should have a historian and an historical committee, to compile into proper form for publication, whatever of interest that could be gathered of the art from ancient to the present time.

It was a matter of surprise and chagrin to the writer, to find that the literature of the German language, pertaining to clays, the making and burning of earthenware far exceeds that of the English language.

The association should also have a statistician, who with the assistance of manufacturers and machine men could collect for the association or revise for and assist the Department of Mineral Resources of the United States Geological Survey, to make a collection more reliable than that department has been able to obtain so far. There are in our country about 2500 tileries, with an average production, (home value) of about \$3,000 apiece, making a total for the United States not to exceed \$8,000,000, yet the report named places it at \$14,000,000, simply because the larger factories report while the smaller ones are seldom heard from.

We find that of clay and its products, viz.: china, porcelain, earthen and stoneware crockery, tiles, common and firebrick, etc., there was imported in 1887 about one-sixth of all consumed, while the home product amounted to about \$48,000,000.

Why can we not produce the one-sixth more and thus keep at home the money sent abroad?

We have in this broad country all kinds of clay and a national association properly managed could be made an effectual instrument in locating and developing our clay beds. Having such an ample supply of clay, if we have not enterprise enough to make what wares we need, we should be compelled to do without them.

CUTTING PRICES.

No one thing has done more to demoralize the tile business than the cutting of prices. And much of this is the result of inexperience in business. Every clear headed business man knows that to sell a product below cost tends to bankruptcy. The result of continuing on this line is as certain as the revolutions of the earth. The past two or three seasons have either been dry or at most seasonable, so that the demand for tile in many localities has not been so good as in years before. Some tile manufacturers who probably went into the business without any knowledge of it, and with little capital have found themselves financially embarrassed, and hoping to tide over, they have offered their tile at rates much below cost, and others have felt themselves compelled in some sense to meet the competition with cut rates, until in some sections the trade has been badly demoralized.

A tile manufacturer of our acquaintance, well located, with no experience

and little capital, began this cutting of prices to force sales, to raise a little money. The more he cut the less the farmers bought, they would talk about buying, but said, "Tile will get cheaper." They understood the situation of things. They did get cheaper and were sold at Sheriff's sale. Another manufacturer who was effected by this cutting of prices, said: "My tile cost me more than the prices at which my competitor offers his. My tile are good; they will keep, and they may stay on my yards until these things adjust themselves." And strange to say, the best farmers bought tile of the latter rather than the former, why, we are hardly ready to say, except it is, that there are, in all good neighborhoods, level-headed men, who approve of doing business on sound business principles. And are more ready to patronize such trade. We have, however, known of one man who drove six miles and back over a bad road to save 75 cents in a load of tile and did not get as good an article. But we suppose that such skinflints will be found, as long as men tabernacle in the flesh.

However, we do believe in progress, and expect them to grow less in number and less in public opinion. The thing to do, is, to make good tile and sell them at remunerative prices, or hold until the demand does take them. In this connection we venture to say that if some of our tile manufacturers would take the pains to ascertain what their tile actually costs them, it would have much to do in stiffening their spinal column in the matter of prices.

CARE OF MACHINERY.

Manufacturers estimate that twenty per cent. of the wear of machinery comes from neglect to keep the bearings properly oiled. The object of oiling is to keep the wearing parts from grinding each other out, and good oil keeps the parts from coming in contact as they roll or slide on the slippery surface. The best oil that will not "gum" is the only oil that should be used, as it is the only oil that accomplishes the purpose for which it is intended. Good oil spreads quickly and friction is reduced to the least possible amount. If too much oil is used it is wasted; if too little, the metal surface comes in contact, heat results, the metal expands and the bearing surfaces are cut out of wear. In textile machinery, especially it requires a good deal of study to know just when to oil and what bearings need most frequent attention but the time given to master the subject is well expended and save much cost in "extras."

A SUCCESSFUL BRICK MACHINE.

The illustration herewith presented to the readers of the Clay-Worker represents the Potts Horizontal Stock Brick Machine with their improved Mold Sanders attached. The first machines manufactured, after being fully tested, were put upon the market in the fall of 1887. While this machine involves no new, or untried principle in its construction, Mr. Potts, however having had several years experience with brick machinery, was fully acquainted with the objections urged against the various devices in use in the construction of this class of machinery and in the construction of this machine

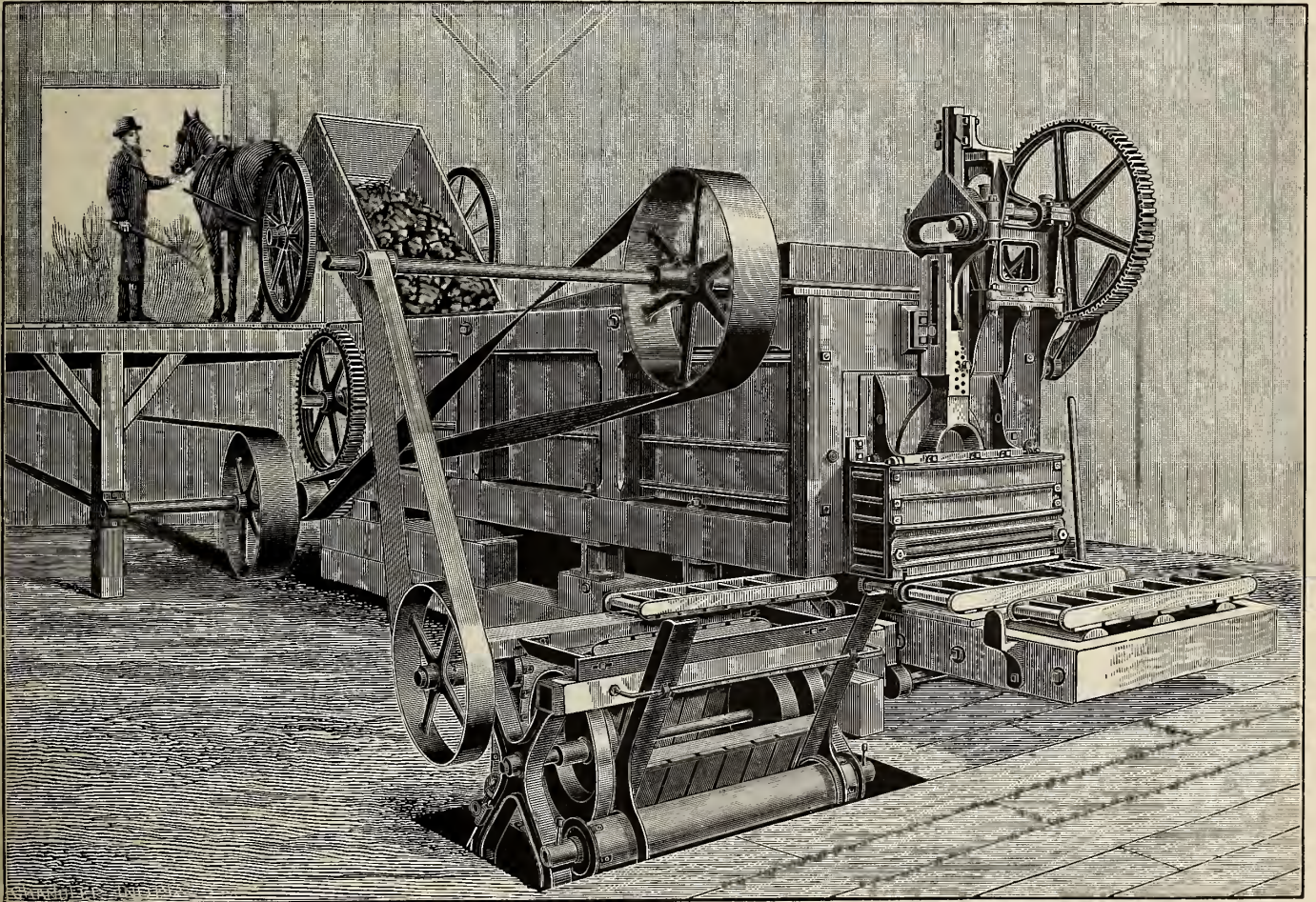
revolutions may be had to each mold necessary to temper the clay perfectly.

On the end of the pug shaft next to the opening in front through which the clay passes into the press box, is a large double feed wing which forces the clay in a straight line into the press box, consequently filling it all the time evenly full of clay, however stiff the clay may be. The molds have always a uniform pressure, therefore the bricks have the same density and size when burned.

This machine works the clay directly from the bank without the use of an extra pug mill required by the vertical machine. The pug box is open on top the entire length, which enables the man

These machines are provided with automatic reliefs in case a stone is caught between the mold and die, which not only protects against damage, but in addition the operator can lower the table quickly and remove the obstruction in a moments time, and then the work goes on.

The machine, as a whole, is so simple in its construction, and the relation of part to part so easily seen, and the relative strength so fully provided for, that inexperienced men have succeeded from the start in operating it to their entire satisfaction. While it is not possible, perhaps, to make a machine that will meet the requirements of the "Deacon's One Horse Shay," to run a hundred years and when it failed, every part to fail at



had it fully in view to overcome the objections and has succeeded admirably, the principal being the well known vertical press box and plunger. The Horizontal Machine consists of a horizontal pugging box 12 feet long, 30 by 30 inches inside. The tempering shaft extends the entire length of the pugging box and is made of 3½-inch steel, which has all the strength likely to be required under any circumstances. This shaft is operated independent of the press which fills the molds, so that any number of

who attends to the tempering of the clay to see its exact condition until it passes into the press box. The temperer can have no reasonable excuse for allowing the clay to get too wet or too stiff or unevenly tempered.

By referring to the cut the reader will see that this machine has no light or complicated machinery or parts underneath liable to injury by the constant falling of dirt into them thereby causing the cutting and unnecessary wear occasioned in this way, and which is so objectionable; but to the contrary, everything is out where it can be cared for and kept clean.

the same time, yet, it is believed by the manufacturers and those who have tested it so far, that in the years to come this machine will be found to be durable, easily operated, and in every way satisfactory.

THE MOLD SANDER ATTACHED.

This machine is the result of careful experiments which have been made the past few years. It needs to be seen in operation to be fully appreciated. For a full description of this machine, or of our full line of clay machinery, please send for catalogue and circulars.

A. PORTS & Co., Indianapolis, Ind.

CORRESPONDENCE.

THESE COLUMNS ARE OPEN TO ALL. THE FULL NAME AND ADDRESS IS REQUIRED BUT WILL NOT BE PUBLISHED EXCEPT WHEN PERMISSION IS GIVEN BY CORRESPONDENT. THOSE DESIRING TO COMMUNICATE PRIVATELY WITH ANY CORRESPONDENT WHOSE FULL NAME IS NOT GIVEN CAN DO SO BY ADDRESSING LETTERS CARE OF CLAY-WORKER.

Supplemental Paper on Brick Tests.

Editor Clay-Worker:

Since writing the article on "Testing Brick," which appeared in the March CLAY-WORKER, I have received samples of brick from three makers not included in the former list. These bricks were contributed by the makers unasked, and were also selected by them. Unfortunately the number of brick sent was too small to make a satisfactory test. Also the tests were made in connection with another series of experiments, and not simply to determine the qualities of these brick; and hence the results do not show the qualities of the brick as well as they might otherwise do.

One lot of brick, which for convenience of reference will be called No. 16, were evidently dry-clay, machine-moulded (pressed) brick, very regular in form, uniform in texture, burned appreciably harder on the outside than on the inside. The absorption, which was quite uniform, was 9.7 per cent. (the mean of seven trials). The modulus of rupture was 1,202 pounds per square inch. The crushing strength of 2-inch cubes, (the surfaces, being smooth, were not plastered), was 1,375 pounds per square inch (the mean of two trials). A brick on end stood 9,420 pounds per square inch. A pile of three half brick (harder burned than the above) stood 6,700 pounds per square inch.

Lot No. 17 was apparently two stiff-clay, die-moulded, end-cut brick. The absorption was 5.8 per cent. The modulus of rupture was 1,665 pounds per square inch. A brick on end, the bed surfaces being plastered, stood 4,400 pounds per square inch.

Lot No. 18 was apparently two stiff-clay, die-moulded, end-cut brick. The absorption was 8.1 per cent. Two brick on end with plastered bed-surfaces stood 5,110 and 4,080 pounds per square inch, respectively.

* * *

I have received a letter from a gentleman who supposes himself to be the maker of brick designated as No. 15 in the former article, in which he expresses surprise that I should have found so much absorption (2.2 per cent. for whole brick).

I have repeated my experiments for the third time—the second time, before writing my former article, to satisfy myself and the third to satisfy my correspondent,—and get almost exactly the same result every time. I also asked a gentleman of unquestionable scientific ability, to determine the absorption in his own way. He weighed several small pieces on chemical balances, immersed for 24 hours, dried with bibulous paper, and weighed. His mean result was 4.8 per cent. The difference in results is due to the difference in methods. However, the differ-

ence between the results by the two methods is extreme, since this brick had a somewhat impervious skin.

I. O. BAKER.

University of Illinois, Champaign.

Convention Brickdust, No. 3.

Editor Clay-Worker:

I am happy to say I am one of the survivors of the late Brick Manufacturers' Convention held at Memphis, Tenn. Although still feeble, my friends have some fears that I may recover. My old friends with a few exceptions were there, and the good citizens of Memphis were there too, and stayed right with us until the last night after supper. They wine, dined and banqueted us, until we began to feel too large for our apparel, hats especially got entirely too small. Particularly was this true of the distinguished humorist from Terra Cotta, Ill.; I know this by sad experience, for he wore my brand new election hat home and left for me that ancient hat which he had won four years ago. I know it is his hat as I found a card under the band, with some indescribable legend printed upon it, which I could not decipher and would not have known who owned the venerable relic, had I not recognized Gates' portrait on the left hand upper corner, better known as the "Terra Cotta Man," whose smile caused St. Peter to set the heavenly gates ajar. I fear, however, Picket's beautiful dream will never become a reality. Since he took my good new hat, and left that aged one for me, I have been taught always to respect old age, hence I will draw the veil of charity over this antique head gear. *Requiescat in pace.*

Yes, we had a successful meeting, a beneficial and happy meeting. Our president was there and has lost none of his popularity among the members and had it not been that an unwritten law forbade a second term, he could not have escaped a re-election; he retires from his distinguished position full of years and honor. By the way, as an after-dinner speaker, as a before-dinner speaker, also as an after-supper speaker he proved a great success. He also made a record as a daisy speaker between meals. We didn't have the pleasure of hearing from his eloquent lips a before-breakfast speech, but we believe he can do that if the occasion demands it.

His predecessor, my distinguished friend from Cincinnati, was only second to him as an impromptu speaker, always ready to speak to the point on subjects that came before the convention, rather retiring in disposition, but can be induced to say "just a word or two" when called upon.

Then my esteemed friend from Denver, but formerly of Philadelphia, was a close third in the race for oratorical honors. The gallant Captain from New England came next and led Colonel McCain a lively race for third place.

Our new president won hosts of friends by his genial way of greeting and conversing with those he met. He will make a popular, earnest and faithful

executive, and is ably seconded by first vice-president Ittner, of St. Louis, a master hand at controlling large bodies of men. He is gentle as a dove and firm as Napoleon 1st. He was the Warwick of the convention—refused the presidency but named the president.

Early in the session a committee was quietly appointed to keep a watch on Randall during the balance of his natural life, to see that he came and went and always got the Clay-Worker out on time. This proved a golden opportunity for them, and they succeeded in chaining him to his post of duty, and were discharged with the thanks of the convention. Randall accepted the situation like a true clay-worker, and wore his chains with a heroism worthy of Saul of Tarsus. In addition to this he was just from President Harrison's own home, as were my old friends Adams and Fletcher. This trio were burdened down with the great responsibility of properly representing this most important city. They, however, were equal to the emergency and neither General Harrison or the beautiful city they came from had anything to fear with such able and enthusiastic sponsors to represent them. Adams' speech at the banquet was timely, eloquent, patriotic, and was heartily endorsed by all present from whatever section of the Union they came. I always look up to friend Adams when I meet him, his genial smile (like everything else about him has no lack of breadth) and attractive face are pleasant to contemplate, even when some of the boys at the play stuck a postage stamp on top of his head, he never got mad. He is the largest man in the convention with a heart in proportion. When we meet in Indianapolis presidential lighting will most certainly strike my good friend.

I hope that every member will be dusty when I have finished.

A—C—MEMBER.

Among the Brickmakers.

Editor Clay-Worker:

If I remember correctly the January number of the Clay-Worker left me at Omaha, Neb. From that great and growing city I journeyed to Lincoln, Neb., where, I had been informed, I would find one of the best equipped paving brick plants to be found anywhere and I must say I was not disappointed.

The Vitrified Paving Brick Company's plant is quite large, having a capacity of 100,000 paving brick per day. The clay is brought some three miles by rail and dumped into pits from which it is shoveled on to a long belt, carried to the crusher, then to a large pug mill from which it is delivered to a Penfield Machine. From the machines, (there being two of them, in fact they have two separate and distinct plants so far as engines, crushers and machines are concerned) after the brick are made they are placed on wooden pallets which are set about six high on iron cars. These filled cars are placed

in tunnels heated by the exhaust steam from the engines.

They have 30 tunnels 100 feet long and are now fitting up 30 more. The brick are run on the cars to the kilns, of which they now have five of the Eudaly square down draft kilns, holding 225,000 each, and are building two more to hold 300,000 each. The kilns are lined entirely with fire bricks and are so arranged as to back a wagon into them at either end, or load into the railroad cars direct from the kiln. I here found a very fine grade of plastic fire clay, from which they were making a very excellent paving brick. I think brickmakers who can find the time will do well to visit this plant as it is one of the most complete in all of its parts that I have ever seen.

I next visited Wm. John Fitzgerald's yard at Lincoln, which I found to be a very large yard. They were running a Chambers Machine and were turning out good brick. Until recently they have been burning in the old-fashioned kiln, but are now putting in the down draft kiln. They already have two small common down draft kilns and one large Eudaly square down draft kiln. I was informed on the yard that they would put in enough of the large square down draft kilns to burn all their brick. I might mention also that they have an Acme dry press machine and are turning out some good brick with it now that they have the down draft kiln. Mr. Fitzgerald has the making of a splendid brick plant.

The clay about Lincoln is of a very peculiar character. It lays in a belt extending from a few miles north of Lincoln down to Beatrice and is found from five to thirty feet below the upper strata of loam and sand.

Lincoln is to have 20,000,000 paving brick laid this season. Stout & Buckstaff have the contract, as well as that of putting down several miles of cedar blocks. Mr. Stockwell, the pioneer in the brick business at Lincoln, also has a good yard. Has a Penfield plunge machine and is drying and burning in the old way. He will put in down draft kilns this season. Lincoln bids fair to be a paving brick centre.

At Weeping Water I found the Boyd Dry Press, a splendid bank of clay, the old-fashioned kiln and a lot of soft brick. They are going to put in the Eudaly Kiln this spring and will no doubt turn out a very fine brick.

At Atchison I did not find many things pleasing to the brickmaker, except the clay, which makes very excellent paving brick. Benning, Beaty & Ellis were running the Little Wonder with good success. They were drying by means of condensing the water in the moist air after it had left the brick, or, in other words, condensing the moisture in the air by causing it to pass through coils of pipe through which cold water was forced from the well to the water tank. This to me was rather a novel way of getting the water out of bricks. To be more particular in my description, the

bricks were placed on cars and run into tunnels which were heated from the bottom by coils of steam pipes. The moist air was then carried up to an upper room or space where run a second coil of pipes through which was forced cold water from the well to the water tank. The moist air from the brick coming in contact with these pipes is supposed to lose its moisture, the air returns to the brick below for a fresh supply of water while the moisture is carried out of the building by a drain trough.

The brick at Atchison are all being burned the old-fashioned way, with about as much loss as I have ever seen. They are losing more brick than would if burned properly pay for the entire running of their plants. One yard had spent considerable money putting in the Iron Clad Dryer, but a small fire came along, supposed to be caused by the malice of one of their men, and all they now have left is an Acme Machine and the necessary engine, boilers, etc.

At Atchison I found quite a number of blocks laid with paving brick; one entire street from the brick made at Galesburg, Ill.

I next stopped at Leavenworth but did not take the time to visit the brick yards as the Soldiers Home was my objective point.

Taking the "dummy" at Leavenworth, I was soon landed at the home. By the way, will some one explain why these small suburban trains are called "dummies?" The Soldiers Home at Leavenworth is quite new, but few if any of their streets are paved. They have, however, a splendid clay for street paving. Mr. John, the civil engineer, had just returned from an extensive trip East, the object of which was to look up machines, kilns, etc. Col. Smith, the governor of the home, informed me that they would put in the Acme Machine and the Eudaly Kiln. It is their intention to put in several miles of pavements as soon as they can. And in my opinion they cannot do it any too soon. Imagine 2500 disabled soldiers wading around in mud; it is anything but comfort I assure you. I will say, however, that they have one of the most beautiful locations, naturally, that I have ever seen and will in time, no doubt, be equal to anything of the kind in the United States.

I next found myself in Kansas City but as there is so much to be said about the brick, streets and buildings of this city, and as I have already mentioned Omaha, it would not be wise to say much concerning Kansas City, the two being rivals.

I find I have already written a great deal and said but very little and with your permission will write something further in the future. A STUDENT.

Thinks Contra-wise.

Editor Clay-Worker:

We derive a good deal of information and some amusement from your magazine. For instance, some one from Indiana, where they have natural gas, says

"it is but a question of time when Indiana will supply Illinois with brick, on account of cheap fuel," (i. e. natural gas). This makes me laugh, as the total cost of fuel (here) for making and burning 1000 brick is but fifty cents, (can he say as much), and fifty cents in this part of the country will not pay the freight very far on a thousand brick.

LUKINS & CAVANAUGH.

Streator, Ill.

Preparation of Clay for Land Tiles.

Editor Clay-Worker:

This is a matter that in the writer's opinion is well worth studying by manufacturers, for in this part of the work it may be said that the quality of tiles are so far regulated. Generally, clay is taken direct from bank and dumped into the machine which serves both for milling clay and making tiles. My idea is that it would be a profitable investment to expend say twelve or fourteen cents per cubic yard in wintering it, i. e., begin to excavate from the bank, say about the end of October, and continue on till ready to commence the summer's making. The process is simple—where there is an open space, cast the clay off just as far as will keep the workmens' feet clear, with an ordinary spade. By so doing it is subjected to the frost of the winter months; is made more plastic for working, and consequently requires less milling and produces better tiles. I might add that the clay taken from bank in the early months of the fall and during the month of January, since they are subject for a greater time to the action of the frost, should be used in the earlier part of the making season while that put out in February, March and April should be reserved for use during the latter portion of the making season. The effect of the frost in the spring months, together with the subsequent 'souring' through the summer months, makes it (the clay, risen during February, March and April,) just as available for first-class tiles as that taken from the bank during the preceding fall. Where it is not convenient to cast it off with the spade, it costs but very little more to wheel it off in trenches, covering on these trenches say two or three feet thick every day. Where the clay is of a strong, unpliant nature it is an advantage to have it dug or cut small so that the weather gets at it better. It is also an advantage when turning over to shower a quantity of water on it. In the event of any stones being in the clay this turning over enables them to be taken out. Where the clay is of a loamy nature it is no great advantage to winter it. Strong clay is what derives most benefit.

The foregoing statements are applicable also to hand or plastic machine brick making. If brick clay was so prepared, it, like tile clay, would require less milling and diminish loss on the production, as well as make a better article.

G. W. B.

Brickmakers at Large.*Editor Clay-Worker:*

In the brick business here the outlook for the present season is very encouraging. Sales are being made rapidly, both for immediate and future delivery. The prices for common brick are about the same as this time last spring, and the demand equally as good; but the pressed brick are sticking at, or about, the lowest prices quoted last fall, and not a very heavy demand for them at that. Still, with the opening of the waterways to New York and through this State, I think the trade will be agreeably surprised with the amount of pressed brick that will be called for during the next two months. It looks very much like a return from Trenton to Philadelphia brick among the New York trade, and consequently brighter prospects for the Philadelphia brickmakers in the near future.

The output for the season will be greatly increased by the erection of at least six new machines and the addition of a number of hand gangs for the making of common brick. The pressed brick will be made very sparingly for a time by some firms, while others intend starting the same number of gangs as usual, hoping for a better time to come.

The wages have been agreed upon for the ensuing year by the committees representing the employers and employes, both committees having full power to act. The list will be printed without further delay. This, taken along with the good, dry weather we are having at present, gives the appearance of an early start which will be pleasant for all hands concerned, as the bosses want the brick and the men are anxious for the work.

Mr. William Fennigan, of Fort Howard, Wis., a member of the N. B. M. A., has just left us after spending a week looking up his relatives and old-time friends that he had not seen since he left Philadelphia just 31 years ago, thus showing that in his prosperity he had not forgotten his old friends who may not have been so fortunate in the race for riches. He was treated right royally by his old schoolmate, I. B. McAvoy, another member of the association, by whom he was introduced at the Master Builders' Exchange where he was treated to a share of that hospitality for which the members are justly celebrated. He left here to go direct to Ohio for the purpose of purchasing a complete outfit for a drain tile manufactory, such as a machine, crushing pans, engine, boiler, kiln-rights, &c. He had with him a list of the advertisements for such machinery taken from the Clay-Worker to assist him in his purchases.

A party consisting of C. B. Siner, Thos. H. Flood, T. B. McAvoy, brickmakers, and G. W. Sharer, dryers, left Philadelphia on Feb. 27th for a visit to the celebrated Penfield Brick Machine Shops at Willoughby, Ohio. They arrived in due time and were met at the station by Messrs. Penfield, who immediately drove them to their shops where they saw what was both interesting and instructive to

them. They were so well pleased with what they did see in the way of brick machinery that one of the party left an order for one of their new and improved brick machines, with the promise of more to follow, provided this one should prove as successful as expected.

On the way home they stopped in Pittsburgh to see if there was anything new in the way of brick machinery in use there. Mr. Chase, of Booth & Flynn, brickmakers, took them in charge, and to him they are indebted for many courtesies extended, he having devoted the entire day to their pleasure.

They arrived home on Sunday, March 3d, well pleased with their trip, and particularly well pleased with their treatment while under the care of Messrs. Penfield & Son. They all unite in saying "that if the Penfields treat all their prospective customers as they were treated, they must have a host of well-wishers throughout the land. F. B. McA.

Philadelphia, Pa.

Artificial Drying.*Editor Clay-Worker:*

To keep my promise to sundry correspondents, and being also reminded by several circulars setting forth the great value of their own particular steam dryers, I will briefly state that I built a drying house for brick, which while not a perfect success, is by no means a failure. It is 138 feet long, 26 feet wide, 6 feet high, with a flat or nearly flat (2 feet rise in 13 feet) roof, covered with tarred felt and sand or gravel. The outside posts for the racks are about one foot from the sides, and the racks extend toward the middle, leaving a passage way of 6 feet for trucks to pass. Ten cleats in each space 108 inches long allow 10 pallets, 9 inches wide, with 18 inches for ventilating space between them, or 11 pallets with 9 inches space divided between them. On 10 pallets we can get 900 brick in each division. The posts are 35 inches from center, allowing 32 inches for pallets, 1 inch leeway, and 2 inches for the post. This will give 47 spaces on each side, in which can be placed 84,600 brick. We prefer not to stow too close, and so have put in so far only about 60,000 brick at once. We started with three rows of 2-inch pipe, taking the exhaust steam from the engine, but found so large a loss of heat escaping from the six ends that we are now adding 600 feet more on each side, making 2,000 feet of 2-inch pipe to radiate heat immediately under the racks, which passes up to 13 skylights in the roof. There are also 13 windows on each side of the building. We had two up-draft and two down-draft ventilators at the ends, but have removed them, as the shortest way out for the vapor-laden air is the best. As yet the bricks have not dried as fast as on the racks in the open air, but when burned they are certainly better bricks. We have not put down a cement floor, but ought to, as it would add much to the dryness of the place. I have never regretted building this dryer, and if we had not already pallet room

outside for 175,000 brick think I should extend the system. I think \$500 will cover the cost so far, but 1,200 feet of pipe will cost \$120 more and expense of putting it down. We use the dryer as a reserve for days when it is too wet for the exposed racks. S. P. C.

NEW HAVEN, CONN.

Touching on Efflorescence.*Editor Clay-Worker:*

It was my intention to attend the Convention at Memphis, but was again disappointed, having so much on my hands that I could not consistently leave home. Then, too, the distance was so great it seemed a great undertaking, though I am sure I should have enjoyed participating in the discussions. It is hoped that the next meeting will be held in Philadelphia or some eastern city and if it is, there will be a large attendance. Philadelphia would be a very desirable place for the eastern brickmakers. I see in the January Clay-Worker that the Convention gave attention to the question of efflorescence, a subject we "stay-at-homes" are all interested in. We have had some trouble with it here.

One case is a church built about five years ago. Last season the whitewash appeared under window sills in the angles and places mostly exposed to dampness. I would suggest that architects in making their plans and specifications might lessen the difficulty by arranging or constructing buildings with a view of preventing this. In burning brick, if they are set too green or if the water-smoke hangs on in places, the brick will come out marked in the same way this leads me to think that though the conditions are different, the cause is the same namely dampness, and that if we can prevent that we find the remedy.

If we put our brick in the kiln thoroughly dry there will not be so much of this discoloring which so mars the beauty of brick structures. F. L. H.

Oneida Co., N. Y.

Kiln Management.*Editor Clay-Worker:*

First lay out the square for the kiln on the ground selected for your works—I prefer 33 feet, but some set them all the way from 30 to 45 feet. The length of the shed should depend upon the intended daily capacity. As to the height that the brick should be set, that depends upon the clay. Some very strong clays are set sixty-two brick high—set on edge. I would not advise setting at first more than thirty-two high, then the height may be increased if the indications are favorable. When they are set too high I have seen the brick badly damaged, for the reason that when in a green state they were not able to bear the weight. In the process of burning there is another strain upon them which will damage them if set higher than the material will bear.

The foundation, or kiln ground should be solid, and uniformly so, or the settling will cause large cracks in the kiln which will damage many of the brick.

If the ground is wet or springy it should be underdrained to insure a good foundation. In some instances it is advisable to put in eight or ten inches of stone pavement in the foundation, then cover with six or eight inches of clay and pack well with rollers; but with a dry location there is no need of the stone. I burned two kilns of brick at the new plant at America for the America Brick Company. The first work on the yard was commenced last July. The works were completed and 300,000 brick burned last season. The first kiln we burned in three days, the second in two and three-quarter days, and the brick were first-class in color and hardness, and the fuel required to burn them did not cost over 30 cents per thousand (wood at \$3.50 per cord) and that, too, in an old style kiln.

I have yet to find a brick burner that will credit the statement of burning brick in sixty-nine hours from the time the kiln was first lighted until the last wood was put in the arches. But as "truth is sometimes stranger than fiction" so it is in this case. Parties who may doubt the truth of the statement can, if they wish, direct a letter to the America Brick Company, America, N. Y., with stamp enclosed for reply, and learn the facts from William Bartlett and Nelson, proprietors. They are truthful and reliable men.

SAM. V. MEAD.

A Clay Deposit for Brick Manufacture.

Editor Clay-Worker:

I have a hundred acres of clay land and fifteen acres of it is within a half mile of the Delaware and Raritan canal and an equal distance of the Pennsylvania railroad depot at this place. The clay is a red shale clay, without any stone and scarcely any grit. It is more than 25 feet thick and is the same from top to bottom, and has two feet top soil over it. The land is rolling and drains itself. This place (Rocky Hill) is fifty miles from New York by the railroad and about sixty-five by water. The distance to Philadelphia is about the same. Excellent brick in every respect have been made from this clay, experimentally, and those made by the "dry process" by a manufacturer who has been particularly successful with that process, were especially satisfactory.

I am desirous of utilizing this clay but I have no practical knowledge of brick-making. You may have among your subscribers some one looking for clay lands near New York, which I am informed is the best market in the country, and it might be of interest to them to know of this place. I shall be obliged if you can tell me whether the dry process of making brick requires a very special kind of clay, different from that used in the plastic method, and if a clay adapted to the dry process is more difficult to obtain than that suitable to the plastic method. I enclose you a little bit of the clay.

K. L. FLEMING.

Rocky Hill, N. J.

[It is claimed by some that the "dry process" requires a clay especially suited

to this process, and that such clays are exceptional rather than common. It is probable, however, that the further developments of this process will discover the fact that clays suited to this method of manufacture are easily obtained and abundant. Plastic clays are abundant, but they differ in degrees of plasticity. It may be that ere long it will be determined that clays differing widely in many respects may be so manipulated as to be worked profitably by the "dry process." The field is open and promising. —ED.]

Philadelphia News.

Editor Clay-Worker:

The brickmakers have been agitating for an adjustment of wages on a higher basis, but have accepted, I believe, a continuation of last year's rates. The brick manufacturers have closed some of the largest brick contracts ever entered into in this locality and everybody is now down to hard work for the season. Our brick manufacturers all give a good account of the season. The telephones are busy. Contractors are rushing in and out, and up and down, the wagons are hauling brick out to the new work and everything looks driving. Mr. Dobbins in the Ledger Building, and Mr. Jorden, at 13 Market, are exceptionally busy. Down along Long Lane business is booming and the long stretch of open space between that avenue and the "neck" will be covered this summer with brick and mortar. Outside brickmakers calculate, they tell me, on selling more brick in Philadelphia than ever. The fine pressed brickmakers also are crowded and last week some of the best contracts of the season were placed. No discouragement is heard. The builders calculate on a big year. Already permits have been taken out for over 2,000 two and three-story houses. An eight-story cold storage warehouse is going up at once on the Delaware River front. This week the Reading Railroad terminal scheme goes through and that means not a few million brick for the road will be in all, three or four miles long and most of it brickwork. The Reading has been fighting the opposition railroad influence in councils for a year or two.

About all we can say here is, we are busy and expect to be busier. Our machinery makers are doing some big work for brickyards throughout the state and elsewhere.

Last season a great deal of brick was sold away down. This year there is a better feeling. While there is no combination, stronger prices will be realized. The same is true in lumber, cement, stone, slate, etc. The volume of business is larger in general trade and manufacturing circles. Railroad traffic and earnings are expanding. The demand for money has sent up the rate of interest a little, but a disbursement last week of forty million dollars has helped to ease the money markets. A Southern paper tells us that during the first quarter of the year 52 brickyards were started in

the southern states. We have not started many in Pennsylvania but we have enlarged a good many and have at a fair estimate, increased our capacity by 10 to 15 per cent.

People talk about the rapidly growing West and the great energy evinced there. Why here in old sleepy Philadelphia we can give the West points. To begin with, we have run ourselves in debt over fifty-seven million dollars and that is something. It costs us about eighteen million dollars a year for water, light, protection and all the luxuries of modern civilization. Last year we gave the builders over thirty million dollars for houses to live in, shops to work in, churches to say our prayers in and banks to put the rest of our money in, and this year we have served notice on them that we want more bricks and mortar. Our gas last year cost us \$3,321,962 besides \$804,000 for public light, for all of which we got 3,200 million feet of gas at an average cost of \$1.02 against an average cost of \$1.40 two years ago.

Though this is not strictly clay or brick talk, it comes in. We laid forty miles of gas pipe and now have 917 miles of gas pipe in all, or enough to stretch from here to you. We drank and wasted and turned into steam and washed our faces with 37,000 million gallons which gave every man, woman and child 740 barrels of water apiece. It cost us \$702,000. Our East Park reservoir holds, when full, 306 million gallons and covers 47 acres and 25 feet deep of water. Our distribution covers 21½ square miles of area and we generally have 560,000,000 gallons on hand, or about 600 gallons per head of population. In addition to this we have about one thousand saloons, so we are all right. Last year we laid 25 miles of water pipe. During the year 326,958 square yards of granite, asphalt, vitrified brick and macadam pavement were laid. There were removed 306,722 loads of dirt from the streets, 500,000 loads of ashes and 88,660 loads of garbage. Last year we built 33 miles of sewers and now have in all, 332 miles. We will soon have two or three lines of ocean steamers stopping here. So we are all right. There is plenty of room to build. The surrounding country is pretty thickly dotted with mansions and palaces where we all go when we get rich. Don't call this an excuse of a letter. An Indianapolis man asked me the other day what sort of a sleepy town is Philadelphia, any way? I hope he will see some sort of an answer to his question in the above.

ANON.

Brick Notes From Spokane Falls, W. T.

Editor Clay-Worker:

I am much pleased with the Clay-Worker, and enclose a year's subscription.

This is a city of about 15,000 inhabitants and a hustler, if there ever was one. I commenced making brick here in the summer of 1880. The town contained about 200 wild and woolly pioneers. I continued in the business up to last year

when I sold out my interest in the largest brickyard north of California to my partner, Mr. H. Brook, builder and contractor. He in turn sold out to Messrs. Spear, Belt & Co., who run it at present. Its present capacity is about 7,000,000 per annum. There are two Martin machines run by steam. There were about 5,000,000 made on it last season. They also run a Perfection re-press last year. That part of the business was only a partial success. The clay on that yard is critical material to burn. If burned just enough it turns out a very fair color, and strong; if underdone they are tender and pale; if burned only a little too much they turn gray, so the boys did not hit it very well on the pressed brick, even if I did train them myself.

Spear, Belt & Co. put in a pottery kiln this fall for burning re-press brick, sewer pipe and fire brick. The clay for this use they get a few miles from the yard. They also talk of putting in pug mills, or crushers, and a semi-dry machine of some kind. They have plenty of capital. The little valley, about a mile from the city, where their yard is, was at one time a lake, and the material for brick is a deposit. The top is fine loam to a depth of two or three feet, then a hard pan for two feet or so, then a very fine clay—a light drab color—then granite sand, medium coarse, some stratas, however, fine enough for sanding moulds. Brick is made of the whole mixture as it comes, loam, clay and sand.

The next yard in size is that of N. Tripplet, about two miles from town. He made 1,250,000 last year. A brickmaker by the name of Kelsey run two water brick machines but only made 200,000. Then there was another yard that made 200,000 or 300,000 which was a failure altogether. I don't know their names. N. Tripplet runs a horse-power Quaker Machine, and makes good brick.

I over-worked myself which was the reason I sold out the big yard. I have been resting and rambling around for a year, and feel like myself again, and I must be of the "earth earthy." I can't keep out of the dirt. I am going to start a yard again next spring. I own 80 acres $1\frac{1}{2}$ miles from town; the clay is very strong and has to be reduced by sand, of which there is abundance anywhere around here. The clay itself is formed from a soapstone which underlies it. When making brick here before, I stripped some of the clay off to the soapstone in the fall, and the action of the frost would reduce several inches of it to the purest kind of clay during the winter. There is any amount of this soapstone formation here. I don't know how deep it goes, but it goes to a great depth, I know. The big yard I spoke of has clay for about 50,000,000 of brick. I don't know how much I have here, but I am satisfied I have a great deal more.

There are mountains of fire and pottery clay around here, which I judge to be of good quality. Mr. Ramsey, who runs "The Pacific Pottery," turns out some very nice ware. There is a young man, not in the business, who is a

fine artist in the way of artistic work, such as vases, statuary, &c. I don't know much about that business, but I did not consider it possible that such fine figures could be made out of clay as his work that I have seen on exhibition. He burns it at Ramsey's. There is another pottery here, but it is not doing anything. One establishment of the kind is enough for this place yet.

I will start my yard this spring on a small scale, but I hope to build it up to the top notch again. I intend in course of time to put in machinery to reduce the soapstone and put the profits, if any, in the most improved machinery. I will put in a re-press next year.

J. T. D.

New York News.

Editor Clay-Worker:

Both real estate and building are feeling the effects—not of a boom—but of a steady business increase which is founded on what people generally, and inventors, particularly, believe to be the sure future of New York City. Building has been in progress all through the winter, and now that spring is here, foundation digging has begun to a surprising extent and the prospects are that the building operations of the coming eight months will be tremendous. Auction sales of building lots have been numerous and a great mass of vacant ground has been purchased by investors and speculators. Of course the former wish to make their purchases income-bearing by putting up houses for renting and just as true is it that the latter are selling to builders who either rent or sell the houses which they erect.

Naturally enough with this condition of things, the brick business is moving along nicely. A well known brickmaker tells me that from the present prospects there will be more building done up to July 1st than was ever done before in any first six months of any year in the history of the metropolis. Of course some of it will be speculative work, but this time the building will be done on real and not speculative values. Brick of good quality can only be purchased now at a price \$1.00 a thousand in advance of the price this time last year and as navigation has been open since the first of March, the weather has been so mild and pleasant and building has progressed as though it were mid summer rather than spring, the supply at first hands is becoming very short and all the manufacturers are hoping to begin unusually early. The owners of the Pallet Yards at Haverstraw began to manufacture late in March, but the frost and snow brought about their overthrow. So it is not probable that any brick will be manufactured before the 18th or 20th of April.

Among the new buildings for which ground is being broken is that of the World which is to occupy space near the Brooklyn Bridge. It will be thirteen stories in height and will be of stone, backed with brick. Other enormous

office buildings contemplated are those of the Union Trust Co. on Broadway, near Rector Street and on Broadway, near Bowling Green, which is to be 17 stories high. The Cotton Exchange is to erect a seven story fire proof building at Beaver and Pearl Streets, at a cost of \$200,000 and the Century Club is to erect its new club house at 43d Street and 5th Avenue. A new church is about being erected at 117th Street and 8th Avenue, while another will be built at 5th Avenue and 127th Street. It will be of granite. The new brick hospitals are also shortly to go up—one St. Peters, in Brooklyn, the other, St. Josephs, in Yonkers. The New York Central will erect a one story brick and frame storage house on the Hudson shortly.

Three new brickyards are about being established at Fishkill, N. Y. When completed they will have a total capacity of about fifteen millions which will be increased to thirty millions within the next two years. The projectors are the Leahey Bros., a young man named Bohn, who was formerly in the employ of the Rose Brick Yards, and Dinan & Co.

The yard of Rodermond & Co., at Verplanks, which for two years had been prevented from running by the stokers, will start up in full headway shortly.

BRIC-A-BRAC.

A Pioneer Brickmaker's Varied Experience.

Editor Clay-Worker:

It might be said that I was born in a brickyard and the event happened near the then *little town* of Cincinnati, Ohio, November 12, 1814. My father made and laid the first brick that ever went into a store in Cincinnati. It was a one story structure on the corner of Main and Columbia or 2nd Street. My father continued to carry on brickmaking and laying until I left his house in the fall of 1834, and came South. I have been engaged in the same line of business ever since on public and private work. I burned all the brick for the U. S. Arsenal at Little Rock, Ark., in 1839 and 1840, also did a great deal of other brick work there. I did a great deal of jobbing (making and laying brick) on the cotton and sugar plantations on the Mississippi River. I made and laid the brick of the State University of Mississippi in 1844 and 1845. I burned nearly all of the brick (near 35,000,000) that went into the great U. S. Custom House at New Orleans in 1850-51-52 and afterwards carried on the business in that city till 1856 when I came here to Florida and took charge of the Co's business which made and burned the brick for Fort Jefferson and *Tortugas Island* near our coast. This contract was for 65,000,000 hard, first class brick. I had burned 28,000,000 of them before the war. During the war I made brick and worked most of the time for companies engaged in the Confederate Government (as the secessionists

called it) and since the war I have been running some of my patents at the North, which in some cases required that I should burn brick which I did in several places, all the way from Baltimore to Rochester, N. Y. So I have been about sixty-five years almost a constant maker and burner of brick in all of its grades and phases, in every kind of clay that a brick can be made of; burning with all kinds of fuel and in all sorts of kilns; getting up patent kilns and brick machines and putting them on the market. I got out a patent for improvement in kilns in 1858 and a patent for a brick machine in 1861. My machine was illustrated in the *Scientific American*, July 5th, 1861.

I published a *short Treatise on Clays, Brickmaking and Burning* and the Theory of Dry Press Brick which was in my circulars advertising my brick machine, and it went through two editions. I might have made money by revising and selling it as it was really the first theoretical treatise ever published on brick making and clays for brick. I believe I can say without fear of truthful contradiction, that no man is now living who has had such a long, varied experience in brickmaking and burning as myself. I have made and burned brick in over one hundred places, and have never found exactly the same kind of clay in any two of the places. We hear talk of *perfect brick* and *thorough brick burners*. No such thing, however, existed. Brickmaking, or I may say, clay-working, is the oldest art practiced by man and if I say it is in its infancy, perhaps you will laugh at my boldness. I can teach a boy to become a perfect bricklayer but I could never finish him up a perfect brickmaker.

Brickmaking and burning involves more versatility of talent, more subtilty and acumen than any other art practiced by man. I have learned far beyond all the teaching and practice. I have been in the business and am yet a student and not a *perfect* master of the art. I have found that clay is a mineral in some respects analagous to the metals. It can be made as porous as sand or it can be made brittle and hard or hard and tough; it can be made as dense and as strong as a good stone but unlike the metals, every kind of clay requires different treatment. I have an inexhaustible quality of clay on my land here from which I make fire brick and also a cream colored front brick of very peculiar beauty and excellence.

Clayworking is destined to be one of our greatest industries. Its importance will be appreciated as the art progresses, and as timber and metal go into disuse for building.

J. W. CRARY, SR.

Remarks on Firemen.

Editor Clay-Worker:

It is generally conceded that the important part of brick manufacturing consists in their being properly burned. There are three things necessary to successful burning: First, to have an abundance of fuel on hand when the fires are first lighted. Second, a skillful burner to manage all the affairs and who knows what to do, how to do, and when to do, to secure success. And lastly is the matter of firemen.

There is a great difference between a fireman who understands his occupation and one who does not. I found this out in my travels among brickmakers burning kilns of brick on first trial. My firemen, as a rule, were selected from among what are termed on most yards, "burners," that is, men who assisted during the burn in wheeling, or carrying wood and building fires under the direction of a head burner or superintendent. These men usually have but little skill in brick burning; none in fact. They only labor to get the work done as directed and as to having any care or concern in the matter it is entirely out of the question. Now to change these men from handling wood to shoveling coal seems to make them entirely indifferent as to results.

I have found where I had new men to instruct in coal firing, and could find no others, to select a capable, willing man of some judgment, show him the importance of the trust and stimulate him to excel by an extra reward. Get your firemen to vie with each other as to which can raise the best heat with the least coal, keep the brightest and clearest flame, ash pit emptied, an abundance of fuel close at hand for immediate use, and then keep all coal and ashes separated and a clean standing place in front of furnaces and about the kiln.

I think there are times when employers are very much to blame for the negligence of their firemen by not paying them sufficient wages and the result is their parsimony acts as a boomerang by rebounding on their pocket books. An owner of a brickyard as a rule, who wants to employ firemen will pay them no more wages than to common day laborers. This is not only unwise but unjust. There are but two changes of hands and these divide the day into shifts of twelve hours each and more frequently prolong their duties through a day and a night, and even two days and a night without any relief. The better plan is to pay these men by the hour the same as the day laborers. This makes their pay a trifle more and at the same time is an incentive to the ambitious laborer for a place to earn more wages.

The owner or manager of a yard can save many times over the increased wages of a good fireman in the saving of fuel bills. I once burned a kiln of brick for a yard owner who demurred at paying over one dollar for a turn of over twelve hours. Among the firemen was one who had fired for two years on an

ocean steamer. This man wanted \$1.50 per day of twelve hours. I prevailed on the yard owner to employ him on trial. I found that he could fire the kiln for twenty-four hours and use no more fuel than any of the others would in twelve hours and he kept a good bright heat and everything in order as I have described. Here was a saving of not less than ten dollars per day in fuel with an extra outlay of fifty cents per day. The man was well worth two dollars per day as a fireman; he was vigilant, orderly and faithful. I would earnestly urge it upon brickmakers to give this matter more attention and secure the very best of firemen and then retain them at wages that will make it an object for them to remain with you. I very frequently have men make application to fire a turn or two at night during the burning of a kiln. I always explain to such men that firemen on a brick kiln have a steady job at firing and I do not intend to alternate the work from day's labor during the day to firing at night just to allow them to earn an extra turn or two. I want firemen just as I want wheelers, setters or any other class of workmen to follow that as their business. This applies particularly to yards that turn out a steady output of brick and are constantly burning their wares.

A fireman who goes on duty in the evening after doing a hard day's work, is in no condition to take charge of work so important as brick burning. He may have an idea that all he has to do is to open the door, heave in the coal and then wait till it is burnt up, and then repeat the process. This might be done, and ton after ton of valuable fuel burnt to cinders and the kiln would never rise above a cherry heat. The fireman who has this conception of the work will take a nap while the fire burns down and trusts to luck or Providence that some untoward accident or incident will waken him to make the next fire. He will quite likely feel cool and shiver enough to rouse himself to see if the fire is burning or he will find himself nodding and falling over, as he is tired and has seated himself on a wheelbarrow or pile of coal, or the watchman will sternly call him to attend to his duties.

When a fireman goes to work rested and refreshed and makes up his mind to do his duty by keeping at work, he will not get sleepy, no more so at night than in the daytime. There is always work enough to keep him busy. The trouble is to get men who will conscientiously perform the work at night as others do in the daytime. They take advantage of the darkness to quit and do nothing after the furnace is filled with coal until it is ready to charge it again. Give your firemen to understand that they are to remain on their feet and be constantly employed night as well as daytime and a move will have been made a long way toward better burning at less cost.

H. BRIX.

Cave Canem.

Editor Clay-Worker:

As I read the communication of your "Yaller Dorg" correspondent it brought to mind and memory certain lines of the poet Coleridge. "As the devil took a walk one day

He saw a cottage with a double coach house,
A cottage of gentility.
And the devil did grin, for his darling sin
Is pride that apes humility."

And yet he calls himself a "yaller dorg"; hints at clay eating, and gives us a lot of chestnuts in regard to weathering clay. His views on machinery remind me of the man who was in favor of the Main law but "agin its enforcement." Let us hope that when he gets that latin lexicon he won't make a mistake and put up "*Ego Sum Stultus*" instead of *E Pluribus Unum*.

Not a "yaller dorg" "or big city brick factorist," but simply a self-respecting brick manufacturer, with a motherly pride in every honest man in the same business. A Subscriber.

A New Field for Clay-Workers.

Editor Clay-Worker:

The valley of "Big Sandy Creek," the head waters of which are in Columbiana county, near the village of Hanoverton, Ohio, and which meanders its course toward the Tuscarawas through several miles each of Columbiana, Carroll, Stark and Tuscarawas counties, emptying into the river, which gives the latter county its name, between Sandyville and Bolivar, is about thirty miles in length and varies in width from one-half mile to a couple of miles. Its soil is rich and its people energetic, intelligent and prosperous. Agriculture has been the chief employment of the inhabitants of this beautiful valley, together with the mechanical arts and mercantile establishments necessary to supply a community of farmers.

For more than half a century it has been known that there were valuable deposits of clay along this valley, and it is fully that long since there was a pottery established at Waynesburgh. It was a small affair, conducted upon primitive plans, but some really fine ware was produced. The small manufacturer, with poor machinery, could not compete with the larger, finely equipped works, and the enterprise was finally abandoned. Recent waking up of interest in clay business has extended hitherward, and the abundant supply of clay has led to the erecting of several works of fair size at Malvern, in Carroll county. Brick, for street paving, is, we are informed, to

be the chief product, and we understand the enterprise is already a success.

Nature seems, however, to have concentrated her efforts in the way of depositing clays in this valley in the neighborhood of Waynesburgh, a beautiful village of a thousand people five miles west of Malvern, on the Tuscarawas branch of the Cleveland and Pittsburgh railroad. There are inexhaustible beds of hard or flint, plastic and slip clays of all grades, and coal, both abundant, of fine quality and cheap.

The climate is salubrious and living not high. Markets are near by for all manner of clay products, and transportation facilities by C. & P. R. R. and Pennsylvania Co.'s. system of roads good, and likely soon to be made better by the completion of the Cleveland, Canton and Southern railroad.

One of these beds, that on the Rinehart farm, is now being operated by Mr. H. L. Wilson, who is making an exceedingly fine quality of brick. This clay burns a bright red, a most beautiful color, and is fine grained and very easy to work. Clay of quality fit for "saggers" is mined within a mile or two of Waynesburgh, and the "slip" clay is said to be of excellent quality.

The owners of lands here are anxious to have persons skilled in clay-working come and prospect the neighborhood, and stand ready to offer most liberal terms to persons with capital. An "Improvement Committee" has been organized of which Mr. Chas. H. Jones is secretary, and they will be glad to correspond with parties interested, and personally escort those who may call upon them with a view to locating here.

PROSPECTING.

So Say We.

Editor Clay-Worker:

Enclosed please find one dollar, to renew my "sub." to Clay-Worker, and I want to say "Thauk you" for the many good things you have given us the past year, and also to those who have so freely given us through your *our* paper the benefit of their experience.

I think our American cousins are ahead of us in that respect, if they get a good thing they want others to share the good. We clay-workers in Canada, are, as a rule, more selfish, or, perhaps, more indifferent as to what others are doing.

When I started brickmaking it was without any experience and a little money, in about two years I had a little experience and no money, but I never

lost faith in the business, and I believe will make it a success yet, in a small way, of course. I hope the Clay-Worker may continue to grow and prosper for it is doing a good work.

C. E. C.
Stroud, Canada.

THE IMPROVED CHAMPION BRICK MOLD SANDING MACHINE.

The attention of brickmakers is called to the new advertisement on the back page of the Clay-Worker of A. H. Newton & Bros., relating to their Improved Champion Brick Mold Sanding Machine. The manufacturers of this machine claim many material advantages, some of which are specified in the "ad." They were the first to place upon the market any practical mold sanding machine, and have supplied all demands from all sections of the country, and while their machines have met with the approval of brickmakers and with largely increased sales each successive season, and have been free from any serious fault of construction or operation, the manufacturers have kept an eye on the requirements of the trade and have met the same by constantly adding new features and improvements until they have produced a machine which is perfect in its operation. By an ingenious improvement of the feed they have avoided all possibility of the molds binding upon each other and at the same time have prevented the scraping and collecting of clay from one mold and depositing it on the adjacent mold which has been the cause of "lumping" the molds. Practical brickmakers will appreciate this improvement and the fact that it tends in such a material degree to producing a clean, uniform and smooth brick. The manufacturers also come out with a fair, manly notice to the public at large that their machines are covered by several patents having broad claims. These cover not only the feed-table as originally constructed, but broadly, the rotating cylinder and a belt for keeping the molds in place while being sanded. Being the pioneers, and having judiciously secured patents for other improvements from time to time, it would seem that followers in the field and purchasers of machines subsequently patented should take the caution to indemnify themselves against prosecutions for infringement, as the user is just as liable as the manufacturer. In fact, in this day of patents and patented machines, it is quite customary for manufacturers to indemnify purchasers and users of their machines against damages accruing by reason of infringement.

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should give both the old and the new address.

ADVERTISING RATES furnished on application.

Correspondence on all subjects of interest to Clay Workers is solicited. Communications from practical men will always be welcome. Address all communications to

T. A. RANDALL & CO.,

14-16 S. Tenn. St., Indianapolis, Ind.

WE ARE OF THE EARTH EARTHY.

It is a pointed saying, "Sprung from the dust, we live upon her bosom and draw our vital supplies from her ample stores, and when 'life's fitful fever' has burned itself out, our ashes drift back to their original source." "We are of the earth earthy."

The clay-worker who all day long, and day after day delves in clay, thinks and thinks, and then strives to work out his thinks, following in this line year in and year out, realizes the truth of our headlines. Success, however, is attainable in clay working along this line. The different characteristics of clays, the varied results to be had by combining two or more clays, the mixing, tempering, weathering, washing, drying, &c., &c., make the business an ever open field for thought and discoveries.

He that enters the clay-working field with little purpose to think and observe closely, concluding that clay is clay, the same as chalk is chalk, that a process adapted to one kind of clay is alike applicable to all, will, ere long, be thrust out a sadder, if not a wiser man.

It is true, however, that the best efforts will often fail for want of proper materials, and yet the materials used may be so similar in appearance and to the touch that experienced clay workers are unable to detect any difference except by practical tests. Every change of material in any way, is an experiment until the character of the clay or mixture of clays is determined by searching trials. The very fact of such varied characteristics found in clays the world over has made

important discoveries and achievements possible in all ages.

Of late years important improvements have been made and the most experienced men in the clay business are quite ready to say that the end is not in sight; to the contrary, only a good beginning has been made. There is so much to be learned about clay, practically the field is boundless. New comers into this open industrial field need to enter with careful steps.

A LIBERAL COMPENSATION.

A correspondent of the Clay-Worker in answering the inquiry of another of our correspondents, did the thing up so well from a practical standpoint that the party making the inquiry enclosed a \$20 bill in a letter of thanks to the former as a partial remuneration for the service rendered. It was a liberal thing to remember Mr. C. T. Saxe in this way, and it is an example that might in many instances be imitated. There are quite a number, comparatively speaking, who are manly enough to acknowledge benefits received, but very few who think of enclosing a \$5, \$10 or \$20 bill as a token of appreciation.

But what about those who can hardly determine whether it will pay to pay \$1.00 a year for a publication devoted to their business? A publication full of just such "practical suggestions" from experienced men, that it does seem that a "way-faring man though a fool" could not fail to be benefited a hundred times over in a year's time. Yet men will run their hands down into their pockets up to their elbows and ask "Will it pay?" And the answer they make to the inquiry is indicative of their success or want of success in business. If a man has not got the snap in him to want to know the practice and experience of others in the same line of business, there is little hope for that man in this world, to say the least that can be said of him.

NATURAL GAS IN INDIANA.

The Indiana gas field is the most marvelous phenomenon of the State. Other productive gas fields are in pent-up valleys, or on the border of mountain ranges, but here we have the largest known gas field occupying the center of a broad level plain with scarcely a hill within fifty miles of it. The field extends from N.E. to S.W., a distance of about 150 miles, with an average breadth of sixty miles, giving an area of 9,000

square miles. Within this territory there are points where borings to the Trenton rock gave only brine, and in a few instances a moderate flow of petroleum followed the drill.

The borings range from 850 feet to 1,000 feet deep, and the ultimate rock pressure is about 250 pounds to the square inch; and while the flow of gas in a given time varies very much in different borings, yet when the well is capped, and the ultimate pressure obtained, it is nearly uniform. The largest wells in Indiana discharge about 10,000,000 cubic feet per day, under the above pressure. In this field there are about 400 borings that may be regarded as paying wells, but the number is being constantly increased. There has been much gas wasted in this field, but the Legislature has recently adopted measures to prevent this.

In composition, the gas is substantially hydrogen, with a variable mixture of marsh gas (carbide of hydrogen) and sulphide of carbon. It burns with an intense heat, giving but an imperfect light. No wells have been in use in this field long enough to test the question of durability. A few wells have filled with brine, which shuts off the flow of gas, while in others the flow has constantly increased, but generally the discharge remains uniform.

A VISITOR FROM THE SOUTH.

A few days ago we had a pleasant call from Mr. H. M. Woolman of Hot Springs, Arkansas. He visits Indiana to inspect methods and machinery employed in brickmaking in this region, with a view of going into that business in his Southern home. He showed some specimens of very fine clay, found in the vicinity of Hot Springs, and one sample that rises to the dignity, and deserves the name of kaolin.

We were glad to learn that Arkansas is waking up to the importance of her mineral resources, her splendid climate and her agricultural and commercial possibilities. We hope to see, in the very near future, this state taking a front position among her Southern sisters, in this race for prosperity and prominence. Mr. Woolman manifested the energy, guarded by the needed caution, that will secure these ends.

Dame Fortune is smiling broadly upon all the varied industrial interests of this great nation and especially upon the clay working industries.

EDITORIAL NOTES and CLIPPINGS.

Whene'er you see a heavy gloom
O'erspread the merchant's face,
And deep, dark silence of the tomb
Reign all about his place
You'll ever find in such a case
That he is far from wise,
And has no chance to win the race:
He does not advertise.

Bennett, Neb., is to have a brick yard.

M. F. Wharton will start a brick yard at Troy, Ky.

Pope & Son will build a brick yard at Camden, Ark.

Dr. Hair will start a brick yard at Buena Vista, Ga.

Richie & Osborne will start a brick yard at Gonie, N. H.

A Pottery is to be started at Kittanning, Pa., to cost \$30,000.

Nelson Mackey is preparing to start a large pottery at San Antonio, Tex.

Gold Bros. & Co. contemplate starting a brick yard at Gordonsville, Tenn.

H. C. Thornton has formed a company to start a brick yard at Midland, Ga.

M. Butler, of Austin, Tex., is building some new kilns—Morrison's patent.

A. W. Snider, of Mt. Pleasant, Fla., contemplates enlarging his brick yard.

The Fairchance Fire Brick Co., of Fayette Co., Pa., has been incorporated.

Jas. M. White, of Easton, Md., intends starting a brick yard at Chocecolocco, Ala.

Finney & Stevens are to establish a large pressed brick factory at Iron City, Tenn.

J. N. Bynum has started a brick yard at Anderson, S. C., with daily capacity of 40,000.

The Pittsburgh brickmakers have accepted the wage scale of last season for this year.

Jno. T. Scott, of Bridgeport, has purchased the Riverside Brick Works at Rush Run, Ohio.

The Troy (N. H.) Brick Co., will enlarge their plant so as to double their present capacity.

Wm. M. Bender, a well-known brick and tile manufacturer of Albany, N. Y., died the 5th inst.

Thomas Bros. have started a brick yard at Turner's Falls, Mass., with daily capacity of 40,000. They expect to make five million this season having already

booked orders for nearly four million to be shipped to Boston and other points. Wm. Eggleston, of Holyoke, is superintendent.

S. C. Moore and others have organized the Helena (Ark.) Brick & Mfg. Co. and will purchase machinery.

The Lynchburgh (Va.) Land Co. desire proposals for the manufacture of a million bricks on their land.

The capacity of the Penitentiary brick yards at Seattle, Wash. is to be doubled by additional machinery.

The Findlay, O., branch of the Hydraulic Press Brick Co. will, it is reported, double their present capacity.

The Webster City, Iowa, Brick & Tile Co., are enlarging their plant and building a Chicago Iron Clad Dryer.

The Knox County Paving, Building, Brick & Tile Co., of Galesburgh, Ill., has been incorporated; capital \$65,000.

The West End Brick & Tile Co., Roanoke, Va., has been incorporated; A. L. Gorley, Pres., J. S. Simmons, Sec'y.

Jesse Edwards, of Newberg, Ore., has sold his tile factory to Jordan & Smith and will run a brick yard at Madison, Ga.

L. E. & E. Harland and C. Hahn have incorporated the Harland & Hahn Brick Co., Chicago, with capital stock \$45,000.

The Georgia Terra Cotta Works, J. T. Ware, Sec'y, have secured thirty acres of clay land near Macon and will build a factory.

The Boone Tile & Brick Co., of Des Moines, Ia., has been incorporated by W. C. Shepard, Lydia C. Malon and Currence Shepard.

Frank McHard's Brick Works at Centuria, Wash., were burned recently. The fire started in the dry house which was entirely destroyed.

The King-Hill Brick & Mfg. Co., of St. Joseph, Mo., has been incorporated by Jas. C. Baldwin, Chas. H. Saunders and others. Capital stock \$35,000.

Robert Holloway, is organizing a company with \$25,000 capital to erect works for the manufacture of drain tile, sewer pipe, etc., at Clarksville, Tenn.

C. & A. Potts & Co. report trade good, especially in their Mold Sander, the demand the past six weeks being so great they had to put on an extra force of men to keep up with orders. They have shipped them to all parts of the country.

Since last issue they have shipped four complete outfits of Brick Machinery and several Disintegrators.

Evens & Howard, the well-known Fire Brick & Sewer Pipe Mfrs., St. Louis, are suing the Missouri Pacific R. R. for \$930 due them as rebate on freight.

The Columbia Brick Works, at Alexandria, Va., has been purchased by W. C. Morrison, of Washington, D. C., for \$93,000. The plant includes 95 acres of land.

F. W. Farquar, of Ensley, Ala., contemplates engaging in brickmaking and desires catalogues of improved machinery and circulars giving information on the subject.

The Pueblo (Col.) Brick & Tile Co. are now making 50,000 brick a day. They start under favorable auspices there being a large demand for brick at from \$7 to \$12 per thousand according to quality.

The Sewer Pipe interests of the Pacific coast are looking up. Clark's large works at Alameda, Cal., are in operation again with a reduced force. They also make fire brick for which there is a steady demand.

The Jeffrey Mfg. Co., of Columbus, Ohio, report a thriving business. The demand for their Elevating and Conveying Machinery continues unabated, while the same can be said of the other specialties which they manufacture.

The Hot Springs Brick & Tile Co. has been incorporated, capital \$10,000, Ellis Woolman, Sec'y and Treas.; H. M. Woolman, Manager. A complete outfit for brickmaking has been purchased from Fletcher & Thomas, of Indianapolis.

The Alabama Brick Mfg. Co., of Chocecolocco, close a notice in a local newspaper as follows: "Thanking our friends for past favors we solicit their further orders and continue making 30,000 a day, rain or shine, of the best brick made in the state."

Blackmer & Post, Sewer and Culvert Pipe manufacturers, of St. Louis, Mo., report an increase in sales thus far for 1889 of 150 per cent. over the corresponding period of last year. Their new works are running regularly, and it is announced that the old works on Summit Avenue, which have lain idle all winter, will start up soon.

Sauk Center, Minn., is considered an excellent site for the location of manufacturing establishments of various kinds and especially brick and tile works, pot-

teries, etc. There are extensive clay banks near there which experiments prove are exceptionally rich in quality as well as quantity. It is surrounded by a fine timber country thus assuring cheap fuel and the market is large and growing rapidly.

George Carnell, of Philadelphia, who needs no introduction to the brickmakers of the U. S., having built for himself a favorable reputation as a manufacturer of brick presses has perfected his Steam Repress and now offers the trade a long felt want. The Peerless Brick Co., of Philadelphia has been running one of these presses for several months and speaks very highly of it. Those interested in this line should write to Mr. Carnell for descriptive circulars.

A. O. Jones, for many years a leading tilemaker at Columbus, O., has moved to Zanesville, O., where he has erected a model factory. The buildings are 64x130 feet, four stories. The clay is virtually unlimited and of excellent quality. For fuel they have coal which they mine themselves. With unusual shipping facilities both by rail and river they expect to do a large business. We hope they will and wish them abundant success.

Geo. W. Sharer reports a lively demand for his Improved Kilns and Dryers, cuts of which appear on pages 214 and 215 of this issue. A large number of these kilns and dryers have been in operation in the Eastern States for the past few seasons and as their good qualities are more fully known and acknowledged the demand for them increases. Mr. Sharer is an untiring worker and we are pleased to know that success attends him and hope his cup may be filled to overflowing.

The St. Louis Iron & Machine Works may well be called the *peers* among builders of dry clay brick presses. They have built all the Hydraulic presses now in use (and have just got a contract for another to furnish within 60 days) also have an agreement to build whatever presses the Eureka Brick Machine Mfg. Co. needs and last but not least build their own "Lion." They certainly have all the experience necessary to manufacture a perfect press and judging from the records, the "Lion" is a "Lion" indeed.

A former resident of our Hoosier state who is now visiting the brick yards of the South writes that the brick interests in that section are flourishing. A trip through Texas found the brickmakers at Houston, Beaumont, Austin, Waco, Fort

Worth and Dallas prosperous and happy, and adds: "While in Mississippi I saw a kiln burned that would fool most of burners, for instead of settling the top of the kiln actually raises four or five inches. The expansion does not injure the brick, as some may think, which are strong and hard."

When a new chief magistrate has to be taken to the national Capital it usually falls to the lot of our great Pennsylvania Road to do the service. Its latest feat is the transportation of President Harrison from his home in Indianapolis to Washington City, a distance of 650 miles, in just twenty-two hours, without a delay, accident or annoyance of any sort. It is this sort of thing in which the Pennsylvania never fails that bears eloquent testimony to its efficient organization, equipment and management. It has done more than almost any other road to make long journeys, which were formerly a severe test of physical endurance, a positive, pleasure and even luxury.

It was our good fortune recently to visit the machine shops of A. M. & W. H. Wiles, at Grassy Point, New York, where the well-known Wiles' Brick Machine is made. These shops were established fifty or more years ago by the father of the present owners and have been in continuous operation meantime. They have been enlarged from year to year as their business increased till now equipped with improved machinery they are making an extensive line of brick machinery and brickmakers' supplies which they ship to all portions of the U. S. There is an air of industry and substantial worth about the premises that impresses one with the idea that their work is one of permanence and we predict that those who visit them fifty years hence will find the same name over the door and the work going on then as now, quietly, but surely. "So mote it be."

A recent visit to the shops of Chambers Bros. Co., near Philadelphia, found them busy as bees turning out Brick Machines, Clay Crushers, Brick Pallets, Etc. When we say busy as bees we do not wish to imply any unseemly hurrying or bustling, for that seldom, if ever, occurs in a well ordered shop and theirs is of that order, where every man is in his place, quietly, but industriously, performing his duties—all at work like one vast machine, running smoothly, without hitch or jar, which says as plain as words: "A master mind is in charge here."

This firm has gained an enviable reputation as manufacturers of reliable machinery. It is their ambition to provide the strongest, most durable and perfect machinery and the constant and increasing demand for the Chambers' machine proves that the craft appreciates their efforts and are willing to pay a good price for a good machine. Their sales so far are far ahead of any former season and they consider the prospects good for a most prosperous year.

EDITORIAL BREVITIES.

Mix brains with your clay if you would succeed as a clay-worker.

"What I don't know," said an experienced clay-worker, "is all about clays." Some new beginners will know much more.

Men who are always finding fault with everybody and all things in the progress of the world, are back numbers of volumes long since covered with the dust of ages.

Machinery of all kinds will last longer, run better and occasion much less loss of time, if kept clean, the bolts and taps tight and all the bearings well oiled. Again we say keep well oiled.

"For want of a nail the shoe was lost; for want of a shoe the horse was lost; for want of a horse the rider was lost, &c." For the want of tightening a tap the machine was badly broken, causing the loss of much valuable time.

What doth it profit a man to save one dollar a year by not taking a publication devoted to his interest, containing the experience of hundreds of others engaged in a like business, and lose hundreds of dollars in not learning the best methods developed by the leading men of the craft?

BUSINESS ADVERTISING.

What is said to be the largest theatrical advertisement on record is that just placed by Mr. Henry Irving in the London Era. It occupies sixty columns, or twelve pages of that paper. It is a monument to Mr. Irving's enterprise as a theatrical manager, and is one manifestation of that business skill which has brought to him success in the department of pecuniary as well as artistic effort. In speaking of this matter the Boston Herald says: "The Napoleonic system in advertising has never failed to produce good results. When we use this adjective we, of course, assume that advertising is applied with judgment, rather than reck-

lessly. There are the proper mediums for it, and there is the proper method of appealing to the public in what an advertisement embodies. No man has employed it in this way, on however large a scale, without realizing ample returns from the operation."

Some houses argue that "everybody knows them," and therefore they do not need advertising. "Everybody knows" Mr. Irving, but he has the good sense to realize that the way to keep a snowball growing is to roll it.—Ex.

NEW PUBLICATIONS.

The Official Report of the Third Annual Convention of the National Brick Manufacturers' Association, held at Memphis, Tenn., is out. It is both a neat and valuable publication, being a verbatim report of the discussions and papers read before the convention. It is especially valuable to those who were unable to attend the convention as by securing a copy they can read at their leisure the full proceedings. It also makes a valuable book of reference being in every respect a creditable publication. Price fifty cents. Address, T. A. Randall, Corresponding Secretary, Indianapolis, Ind.

Mr. Anthony Ittner, the well-known brick manufacturer, of St. Louis, Mo., has favored us with a copy of his catalogue of St. Louis Pressed, Molded and Ornamental Brick, which he manufactures in endless variety. A notable feature of the book is a cut of a large and beautiful mantel built of Mr. Ittner's brick, which takes the eye and gets prettier the longer one looks at it. A copy of the catalogue will be sent free on application.

We are indebted to the Royal Brick Co., Bridgeport, O., for a copy of their handsome catalogue of Molded and Ornamental Brick which is a work of art and should find a place on the desk of every architect and builder who appreciates fine brick and terra cotta.

The National Barrow and Truck Co., New York City, whose ad. appears on another page, have out a neat 8-page circular illustrating the various Trucks and Barrows made by them. Send for a copy.

Chandler & Taylor, Indianapolis, Ind., have issued a neatly illustrated Catalogue of their Engines, Boilers, Saw Mills, Etc., Etc., a copy of which will be sent to any of our readers on application.

The Rome Brick Co., Rome, Ga., are out with a neat pocket catalogue showing

MENTION THE CLAY-WORKER.

When writing to Advertisers

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METALLIC APRON CONVEYORS,

(Sometimes called clay elevators). Adapted to feed Brick or Tile Machine.

TILE ELEVATORS, (New Pattern),

Will elevate any size up to 18-inch. Send for Prices.

LINK BELT ELEVATORS (using buckets),

Will elevate Semi-Dry or Pulverized clay.

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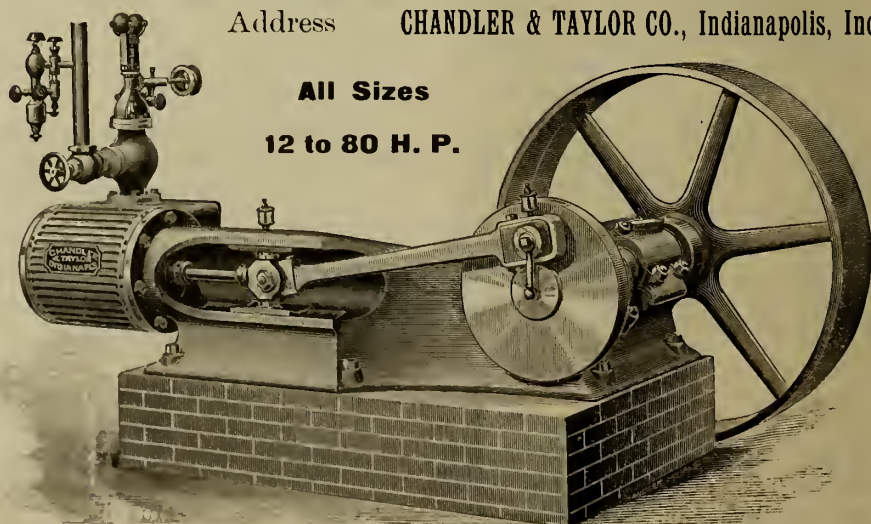
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THE CLAY-WORKER

VOL. XI.

INDIANAPOLIS, IND., MAY, 1889.

No 5.

Written for the Clay Worker.

EXAMPLES OF AMERICAN BRICK AND TERRA COTTA WORK.

No. 15.

CYCLORAMA BUILDING, INDIANAPOLIS.

We herewith present to our readers a view of the Cyclorama Building situated near the State House in this city. It has a frontage of 132 feet with an arcade extending from Market Street to main building, store rooms, business offices and stairway to second story front the Arcade. The front brick are laid in red mortar. The ornamentations in terra-cotta were furnished by the Indianapolis Terra Cotta Co. The main or Cyclorama Building is one of the largest in the country, being 400 feet in circumference and 100 feet in height. In the center the walls are 52 feet high. The entire inside of the outside wall is covered with the great painting of "The Battle of Atlanta." E. C. Miller, Builder and Contractor.

Built from designs and plans by J. H. Stem, Architect.



THE CYCLORAMA BUILDING, INDIANAPOLIS—J. H. Stem, Architect.

FIRE BRICK PAVEMENT.

In Wheeling, W. Va., fire bricks for street pavements have been used with marked success. The *Manufacturer* of that city says pavements made of this material have been in use there five and six years and are yet apparently as good as new. It adds: The mode of laying

the bricks is neither difficult nor expensive. After the grade is fixed, the foundation should be prepared with care with a view to the durability of the brick. A clay bed is the best. If laid where frosts are common and heavy then four inches of good gravel should cover the clay and that topped out with two or three inches

of sand. In a warm climate where frosts are not likely to occur, two or three inches of good sand spread on the clay will make a durable bed. In making the bed it should crown about 6 inches for a 40-foot driveway. In laying the brick care should be used to break the joints of each course, then roll with a heavy cy-

linder. This presses the brick into the sand forming a solid joint underneath, and when sand is thrown on the top a perfect joint is made, making a pavement as strong as a solid arch can make it with a firm foundation under each square inch of it. After covering with a thin layer of sand, the pavement is ready for

a thin top dressing of coal tar pitch heated to 300° F., which fills the interstices and makes a covering for the brick that protects and increases their wear. There is a wide difference of opinion relative to the use of the coal tar pitch. It is generally used in this city, but in some towns, notably Steubenville, Ohio, it is not used. It is generally agreed that it does not increase the strength of the joint, but the covering protects the brick. With this view, the covering of pitch should be renewed once a year which will add about 50 per cent. to the life of the brick.

Care should be observed that the bricks are not made too large. A large brick does not burn evenly and is apt to be soft at the center. All sizes have been thoroughly tested in this city and that experience has fixed upon this size as the best and most durable, viz., 8½x4x2½-in. Fifty-eight bricks will lay a square yard which will make about 17 square yards to the thousand brick. The average cost of these brick is about \$10 per M at the

yard. The cost of the pavement will depend largely on the amount of grading and filling to be done. In this city where a good deal of grading is required, the average cost of the pavement is \$1.25 per square yard, including the pitch top dressing. In some towns in this vicinity, it has been laid as cheap as 95 cents per square yard. But if it is covered with the coal tar pitch about 12½ cents per square yard will be added to the cost. The fire clay to make a good paving brick should contain some iron to make it hard and durable. A fire clay to make a durable furnace lining will not always make a good paving brick, as it must be free from iron or it will melt when subjected to great and constant heat and *vice versa*.

Written for the Clay-Worker.

MANUFACTURE OF ROOFING TILES.

BY CHAS. T. DAVIS.

But few roofing tiles are now manufactured in the United States by the hand process. This method continues to be employed in England to a considerable extent; only slight improvements have been made in this mode of production during the past century. By the machine process there are manufactured at Akron, Ohio, and at other points in the United States, a highly satisfactory quality of roofing tiles at but a small cost when compared with the hand method of moulding. The manufacture of plain roofing tiles by the hand process, however, can be conducted with small capital the process and requirements not being intricate or expensive and the re-establishment of this industry in some portions of the country might prove a profitable venture if operated in connection with other clay works. To conduct, however, the manufacture of all the tiles required for roofing and the numerous other articles generally made in large tileries requires considerable capital and a thorough knowledge of the business in all its details. The clay of which the tiles are made is dug and spread out in shallow beds to disintegrate during the winter season, the water contained in the clay expanding and breaking it in every direction. At one time very inferior roof-tiles were made in England on account of the careless weathering or preparation of the clay employed and in order to cure this a statue of Edward IV required that all clay for tiles should be dug or cast up before the first of November and not made into tiles before

the March following. Sometimes when the clay has not been exposed to the frost it can be disintegrated by spreading it out in thin layers, and exposing it to a hot sun.

Iron rolls are often employed to disintegrate the clay and crush or separate from it all stones and gravel. The clay must next be tempered, that is, reduced to a homogeneous and plastic mass. The usual form of pug mill employed in England for tempering clay for roofing tiles is generally six feet high, three feet in diameter at the larger or upper end and two feet at the bottom. The clay is kneaded and thoroughly mixed by a revolving cast-iron spindle which carries a series of flat steel arms so arranged as to have by rotation a worm-like action upon the clay which is pressed from the larger to the smaller diameter of the tub in which the clay is confined and finally comes oozing out of an aperture at the bottom. In this manner of tempering great cohesive power is given to the clay. After it issues from the pug-mill the clay is usually ready to be moulded into roofing tiles; the moulding is commonly conducted in a shed and most of the manufacturers prefer to place their tiles in the open air if the weather allows.

The moulding-table or bench upon which the tiles are shaped, is supported on four legs which are placed well under the bench leaving the two ends of the top of the table to project liberally. The coal-dust box 14 in.x8 in., is at the left hand of the moulder resting on the corner of the table and the moulding-board 14 in.x10 in. is usually placed slightly to the right of the coal-dust box. The mould employed is 12-in.x7¾-in. and ½-in. thick made of oak and usually plated with iron. The moulder when he wishes to form a tile works a lump of clay with his hands into an oblong square; the mould is placed on the bench and fine coal-dust sprinkled over it; the lump of clay is then taken up and dashed down into the mould with force, the surplus clay is cut off level with the top of the mould by a brass wire strained upon a wooden bow and the tile in the mould is finished by adding a little clay to it if necessary, and smoothing the exposed face with a wooden tool. The moulded tile is then placed upon a thin board, first sprinkled with very fine coal dust and so the process is repeated, the lump of clay being added to every time six tiles are moulded.

The boy or off-bearer carries two tiles

at a time, one on his head and one on his hands to the floor, where they are allowed to remain for four hours out of doors in fair weather and then collected and placed together, the nib end changed alternately so as to hack them closely and squarely. The situation of this hacking should be dry but not hot, and the tiles remain hacked for two days so as to allow them to toughen. The set or curve form is then given by placing six of the tiles at one time on the top of the horse, which is a three legged stool having the top about three-quarters of an inch longer than the tile, the top being a convex curve to a radius of about ten feet and three inches and having a height of about two feet and seven inches from the level of the ground. In placing the tiles on top of the horse, the nib end is reversed each time and as they lie closely together, three quick blows are given to the tiles with a block which is concave, so as to correspond to the convexity of the horse. The tiles are then again hacked and dried and next carried to the oven twelve at a time, with the edges of the tiles resting against the breast of the carrier.

About nine thousand tiles are commonly burned at one time when the old fashioned Staffordshire oven is employed, but with larger kilns the quantity of course can be increased. The time required to burn the small ovens of tiles is usually about from thirty-six to forty hours.

In London tileries, which are the largest in the world, there is paid particular attention to the proper preparation of the clay for the particular purpose for which it is to be used, there not being the same haste to get the clay into the kiln that is so often shown by some of the smaller manufacturers. The first step in preparing the clay in London tileries is the weathering, which is accomplished by throwing the clay into pits covered with water and leaving it to soften or ripen. The clay is then usually passed through the rollers and the stones taken out before it is put into "soak," which is a term also used for the mellowing process. The kilns used for burning the wares produced in these extensive London tileries are usually conical in shape, far more than one-half the height, about forty feet wide at the base, and have a total height of about twenty-five feet from the bottom of the ash-pit to the top of the dome which is slightly convex. These kilns are quite expensive to construct, eight thousand dollars being about a fair average cost as fire-

bricks of the best quality are largely employed in the interiors.

The manufacture of roofing tiles is one which is now rapidly growing in public favor. With us the tiles are usually of three colors, red, buff and black. The color of the red tile is produced by the employment of clay containing a large percentage of oxide of iron; this is sometimes present in the beds with fire clays, which are the class usually employed for roofing tiles; at other times it is necessary to mix some foreign clay containing a large percentage of oxide of iron with the material. The color is made deeper and more uniform by rubbing the tiles with finely sifted red moulding sand; this should be done while the tile is quite damp so that the sand can be made to adhere to the tile. The buff colored tile is made of nearly pure fire clay and is slightly lighter in weight than the red tile. The black colored tile is produced by washing it over with manganese dissolved in water before the tile is placed in the kiln, and in the process of burning the manganese is converted into a perfectly durable coating of great hardness.

The small diamond tiles are 6-in.x10-in. require 500 to cover a "square" and weigh 600 pounds. They are nailed to the sheathing with two five penny galvanized nails and are used more especially for towers, porches, dormer-windows and in side panels for ornamental purposes. Large diamond tiles are 14-in. x8½ in. 250 cover a "square" and weigh 650 pounds. Two six-penny galvanized nails are used to secure it to the sheathing. This kind of tile is used more than the other forms for regular roofs as it is lighter in weight and less in cost.

The shingle tiles are the plain flat tiles. After burning they are three-eighths of an inch thick, have two counter-sunk nail holes and can be made of any required size not exceeding 6-in.x12-in. Tiles have been largely employed in the Eastern States and on some expensive buildings for roofing and side ornamentation as at the State Capitol at Albany, N. Y., on which building they are secured with copper wire to iron ribs. Tiles of this kind are generally laid so as to expose about five inches to the weather which require 480 to a "square" the weight being about 1100 pounds.

The pantiles measure twelve inches in length by six and one-half inches in width at one end and four and one-half inches at the other and if they are lapped three and one-half inches on the roof,

350 will be required for a "square" which will weigh 850 pounds. This kind of tile makes a strong roof cover and can be walked upon without danger of breaking and it is especially useful for workshops and factories. It is sometimes made with lugs to hang on to ribs, the use of nails being thereby avoided, which is desirable, as nails are liable to rust away where much bituminous coal is used. But the tiles are also made with nail holes to secure them to the sheathing boards as for private dwellings, etc. The crestings and finals used with tile require artistic treatment and are generally made by manufacturers of terra-cotta.

Written for the Clay-Worker.

BRICKMAKING AND BURNING.

No. 2.

BY JNO. W. CRARY.

Near the conclusion of my first article in this series, I stated the most practicable way for testing clays in their nature of drying is the sun for if clay will not stand sun drying it will not, as a rule, stand sufficient heat in burning to make a good brick, though if clay cannot be had that will stand sun drying, still a very good brick may be made by tempering clay that cracks in the sun in a "pug mill" and drying the brick on "pallets" under a shed and if there be no shed or pallets the brick may be laid on a yard floor as usual in the sun and as fast as laid down in rows, dust or sand may be sifted on the brick so as to cover the surface thus forming a partial non-conductor of heat so that a rapid contraction of the top surface of the brick is prevented and the evaporation of water in the brick equalized on all sides but in all cases brick dried on a pallet under a shed properly constructed, is at least a third stronger and better than brick dried in a hot sun, especially if there be much wind. The slower and more equal on all sides a brick is dried, the less porous and stronger it is. If it is desired to test clay in burning and no regular brick kiln is convenient, after a small sample brick shall have been made, as I stated in first article, such sample may be enveloped in a coat of clay half an inch thick and after being dried may be put in a blacksmith's forge with a very low heat until well dried off, then the heat may be increased until the clay coating begins to show signs of melting. Then let the fire die out and when cold take out the sample, knock off the coating and though the specimen will not be as good as if burned in a kiln, yet it

will determine the practicability of making brick of such clay.

THE BEST WAY TO PREPARE CLAY FOR "MUD BRICK."

Having decided on a "clay bed" for brick: if it is for mud brick, the clay should be dug and thrown up in the late fall or through the winter, so that the rain and frost will disintegrate and soften it as well as to dispose of an excess of salts or flux that may be in it. If clay be dug and hauled to the pit directly from the "bank," it is a difficult task to get it tempered so that the brick will be uniform in size or chemical composition and if a kiln of brick is not made of clay homogeneous in kind, quality and mixture, it is impossible to produce a good uniform size and color of brick.

The tempering of clay is a most important part in the manufacture of clay goods of any kind; nine-tenths of the brick manufactured are of imperfectly tempered clay. A perfect disintegration and amalgamation of clay is absolutely necessary to get the best results in the manufacture of anything made of it for building or domestic purposes. The time is coming when the working of clay will be of as much importance and concern as the manipulation and mixture of iron and steel. Our "Lumbermen" seem to have a mania for destroying all of our timber forests. The ruthless and prodigal waste in the manufacture of lumber and the excessive "output" thrown upon a glutted and sluggish market will, ere long, exhaust the supply and clay and iron will be chiefly employed in building. The Arcade principle in architecture will be adopted and clay will be moulded in columns, segments of arches and tiles, so that with a little iron the most massive structures as well as the laborer's cottage will be built chiefly of indurated clay.

The streets of our cities will be paved with brick or clay blocks the size of two brick, but the clay must be strong and tempered if moulded, and thoroughly mixed and pulverized, if pressed dry, and in all cases perfectly burned. From these premises it is very obvious that the clay industry will, in all its departments, rank not less than third in mechanical pursuits.

TO PREPARE CLAY FOR "DRY PRESSED" BRICK.

In 1861, January 5th, I had a dry press brick machine of my own invention described and illustrated in the "Scientific American" and I published a

circular setting forth the whole theory of making and burning dry pressed brick. My machine gave brickmaking by dry pressure an impetus that has culminated in the fact that with the right kind of clay, handling and burning, the strongest kind of brick may be made by pressing clay dry. If a substantial "plant" is to be made for the manufacture of "dry press brick" it is necessary to have a bed of considerable depth, homogeneous in character from top to bottom. Then the clay should be "caved," and then cut up well and hauled in under a large shed which should be divided into two parts; one-half of the shed should be filled, say from four to eight feet deep and with enough clay to run the machine three to six months. While that is being used up, the other half of the shed should be filled so that a full supply of clay with its moisture equalized, can be constantly had. The raw material being thus prepared, a machine should be well put up that will pulverize the clay as fine as corn meal and at the same time thoroughly comminute it before it goes into the press. The pressure should be applied slow. If it be a direct pressure press there should be a top and bottom plunger and only one of them act at the same instant, so that the present air in the clay may escape more perfectly. My machine exerted the pressure by a roller which in passing slowly over the mould expelled the air before it. The clay should be dry enough to allow the brick at once to be set in the kiln. My machine carried the brick on a belt immediately into the kilns to the "setters" and the raw clay may be brought from the clay shed to the machine in the same manner so that the whole process may be automatic and all labor saved excepting the clay getting and the setting of the brick. If dry press machines do not do all this the labor-saving feature is lost.

THEORY OF DRY PRESSING CLAY TO PERFECTION.

As I have said previously, clay is a powerful "hydrate." It absorbs water greedily and never parts with it unless subjected to a heat near fusibility. Clay in its different forms, conditions and admixtures with other substances, plays a more important part in the geological interest of the earth's surface and its adaptability to the life and wants of man and animals than any other mineral.

A few of its actions are to absorb mineral poisons and all poisonous fluids that come from the decomposition of vegeta-

ble and animal life. If it were not for the absorbing power and neutralizing effect of clay in solution in the vast body of water in the Mississippi and the clay deposits of its great "Delta," no animal life could exist on its shores. Clay in some form is absolutely essential and indispensable to agriculture and so I might go on and enumerate *ad infinitum*. But to the point. It seems absurd to say we can make brick of dry dust—clay; but when we see that dry clay is a term that can only be used relatively, and that in fact, there can be no such thing as dry clay, we may hope to make brick by pressure and I will give you the proof by a test you can make at any time, in two minutes, without costing a cent and you will be astonished most at its simplicity. Take a lump of clay as dry as you can get it, say two ounces, put in on an anvil or other smooth, solid, iron surface; then take a hammer with a smooth face, strike the clay a light blow—you will crush it. Strike again, you will reduce it to an impalpable powder. Increase the force of your blow a third or fourth time and you find a thin, damp, lamellated piece of clay so dense, hard and strong that it resembles metal. The attraction of cohesion is thus perfected so that if five or six pounds of the clay were put in a "die" and fifty to a hundred tons pressure put upon it, you will have a perfect brick and if burned properly, it would be superior to any plastic clay brick. In a common size brick made by a good "dry press" machine, twelve ounces more clay is contained than in a "mud" brick of same clay and size. After a dry press brick is well made it is simply a question of burning as regards its superiority over a mud brick. Burning mud brick and burning dry pressed brick are just as different as working and tempering steel for a common hoe and the best blade for a sword or spring for a watch.

Written for the Clay-Worker.

BRICK, AS AN ARTICLE OF COMMERCE

BY PROF. R. T. BROWN.

In tracing the progress of the human race from the condition of a savage to our present stage of civilization, we note the curious fact that the introduction of machinery operated by power, other than human muscles, in supplying the wants of man, has always resulted in making the article thus produced, a subject of commercial exchange. The savage, in his lowest condition, made his own bows and arrows, killed his own game, dressed its

skin for his clothing and its flesh for his food, made his own garments and wore them. A little further on, and he was a keeper of flocks and his wife prepared the flesh and milk of his herds as daily food, and with the distaff and loom, had learned to convert the wool of his flocks into textile fabrics for clothing and for the tent that was his home as well. Another step took him to the cultivation of the soil and the production of bread material, but for more than 2,500 years the grain of the husbandman was prepared for bread at home—"the women grinding at the mill," and it was only in great cities like those of Egypt, that the wealthy performed this work by their slaves, or purchased the finished product after it was completed. This was true of the textile fabrics also. While the rich, by the labor of their slaves produced a large surplus for the market, that clothed the wealthy in "purple and fine linen every day," the common people made their food and clothing at home.

Though water was used as a motor as early as the third century of our era, it is less than 500 years since it came into general use in the manufacture of bread stuff, and flour became an article of commerce. Until steam was taught to spin and weave, nearly all our clothes were made from fabrics of home manufacture; but with the introduction of steam as a worker, came the age of the "ready made." It does not require more than human prescience to see that brick will follow in the line of every other product where an inanimate force takes the place of hand labor in its production. The chief obstacle which hinders machine-made brick from becoming an article of commerce, immediately, is its heavy transportation. But the application of machinery to the manufacture of brick is in its infancy, and we may confidently predict that such improvements will be made, as will give the machine brick such a superiority in quality and in the speed of production, as well, as will command the market in all places within the reach of railroad or water transportation. The manufacture of brick by machinery is scarcely more than half a century old and our best machinery is far from being perfect, yet we are able to mould 50,000 bricks per day, of a quality that will compare favorably with the average of hand-made brick; and we are able to dry them ready for the kiln in half the time that would be required to dry them on a

yard, and without the risk of loss by rain. In doing this work the expense, at the ordinary price of fuel, does not exceed fifty per cent. of the cost of the same number of bricks made by hand.

The ordinary method of burning brick in extemporized kilns, involves a great waste of fuel. In the country, while wood was plenty, but little account was taken of this; but fuel has come to be an object of economy, and every improvement that saves it is of prime importance in brickmaking. The massing of 50,000, or even 25,000 brick in a continuous kiln effects a great saving of heat, other things being equal. But there is a leak of heat in brick-burning which has not, as yet, been successfully arrested. From the time the watersmoke disappears, there is a rapid current of dry, heated air ascending from the surface of the burning kiln, if that surface be open—if not, then from the draft flues. In this there is generally lost, more than heat enough to dry an equal number of green brick, and prepare them for the kiln.

Economy in the expense of burning brick and the ability to burn thoroughly with the smallest possible per cent. of loss, are matters of the first importance in the manufacture of brick for the general market. We are convinced that manufacturing capitalists in general, and clay-working factors in particular, have not duly appreciated the importance of natural gas as an element of success in this direction. The gas field of Indiana, stretching from the center of the state, in a northeast direction into Ohio, in a belt of an average width of at least fifty miles, gives an area of more than 5,000 square miles; on every section of which, with scarcely an exception, gas may be obtained at a depth, ranging from 900 to 1,000 feet, and in quantities sufficient to supply a manufacturing plant of the first magnitude. This field is a comparatively level territory already traversed by half a dozen railroads in active operation, and as many more as are needed may be constructed with but little more expense than that of ties and rails. This region abounds in beds of clay adapted to every variety of common clay work. As yet, no fancy prices have been placed on available situations for a manufacturing plant. A bed of good clay near a railroad may be selected and 40 acres purchased at about \$50 per acre—perhaps less. A boring to the gas will cost \$1,000 or \$1,200. This will ensure fuel for all purposes, which will be under the absolute control of the proprietor. Cottages for

the occupancy of the laborers employed may be built and rented for, at least, the interest on their cost; but nearly all the labor of the plant may be done by steam power, costing no more than the interest for the sum expended for the boring and piping. This is a constant power, not liable to the casualties of drouth or frost, nor to the strikes of coal miners, or railroad laborers. In its use gas incurs less expense than any other fuel. It requires no fireman to handle the fuel, and no team to supply it, nor to remove the ashes and cinders. Moreover, it is uniform and constant in its supply at whatever rate you set it and it requires little or no attention, till it is desirable to change the rate of heating.

In burning brick, tile, or other clay products, gas is the most manageable form of fuel because it is all flame, and when properly supplied diffuses itself pretty uniformly throughout the kiln, filling every vacant space with flame of nearly the same temperature. The result is, uniform burning—no melted arches and but few salmon bricks. We can afford to burn more thoroughly, for it costs no more to burn two or three days longer, than not to burn.

With gas to generate steam and to burn our kilns, brick, from a good machine, may be placed on the cars, ready for the market, at a cost not exceeding 33 per cent. the price of hand-made brick. With fair rates of transportation, this will enable the brickmaker in our gas field to compete profitably with hand-made bricks anywhere within 300 or 400 miles. Under these circumstances, brick must, in the near future, become an article of commerce.

[NOTE.—I have written the foregoing at the suggestion of no one. I have no pecuniary interest in a single acre of the gas field, nor in the stock of any gas company. I have written for the public good only.]

Hollow Brick, it is said, are coming into more general use in eastern cities, and quite a number of large buildings have been built with them. They crush at 30,000 lbs., or about the pressure which the best solid brick will stand. They are made 8x8x12, with walls one inch thick. It is claimed that they cost one-third less than the regular form, making walls proof against fire, moisture and frost, being warm in winter and cool in summer. They require a peculiar clay in their manufacture, one that will not shrink when dried or burned. The brick are set on end, thus making a wall hollow from top to bottom.—*Ex.*

Written for the Clay-Worker.

BURNING AND BURNERS.

BY D. W. STOOKEY.

The most important part in the process of manufacturing clay wares is that of burning. At this stage all the cost of production has been expended and any loss here involves not only the loss of the labor and expense of burning but the whole cost of the ware from the crude material to the finished product. The loss of a piece in the kiln is equivalent to its loss as a completed article ready for the market. Each handling and every stage in the process of manufacture represents and involves an additional expenditure of value and these are all accumulated in the burned ware. Not only is the expense of production lost but the profit that the manufacturer hoped to realize from the sale of the ware is also lost as he is deprived of the sale. Ten pounds of clay in the bank may be of no appreciable value but after this amount has passed through the different stages of manufacturing it may be worth—nothing, if injured in the kiln or several dollars if it comes through in the condition desired by the manufacturer.

There are several objects or results to be obtained in burning clay wares and these are attained at different temperatures. The first is simply a mechanical change and consists in drying or driving off the moisture that is mechanically held in the clay and that remains after the ware has been dried subsequent to having received the desired form either in the plastic state or by the process popularly known as dry pressing. This drying is accomplished at comparatively low temperatures and the best results are obtained by a free circulation of large quantities of heated air through the kiln. The second is a chemical change in which the combined water is driven off and the composition of the ware changed. An ideal or chemically pure clay is a hydrated silicate of alumina. In this state, when properly moistened, it is plastic and may be given varied forms and again reduced to its original state or condition as clay. When the chemically combined water is driven off it loses its plasticity, ceases to be clay, and cannot again be reduced to its original clayey condition. This occurs at the temperature indicated by dull redness. Another change consists in fusing or melting some of the constituents of the ware. Clays in the natural state contain varying quantities of impurities. Many

of these are fusible at the temperatures reached in the kiln. When so melted these ingredients combine, both mechanically and chemically, with each other and with those parts of the clay not fused and when cooled the results are manifested by the hardness and vitrified condition of the clay product. The two changes last named give to burned clays their apparently indestructible properties and make them practically proof against the ordinary influences of air, water, acids and the destroying tooth of time. Change of color is another result obtained and often desired in the process of burning. The effect known as glazing is also wrought in the kiln under the influence of heat. The size and form of the pieces must be maintained as nearly as possible during burning and the texture made as strong and enduring as can be done from the particular clay used.

The burning must be adapted to the class of ware in the kiln. If it is desired to produce face brick the heat must not be raised high enough to injure the color nor melt or warp the brick out of shape, whereas, if paving brick are wanted they must be burned harder. In this case hardness is of the first importance and must be obtained even at the sacrifice of color and form. If a salt glaze is to be applied the temperature must be raised to the degree at which the clay will take the glaze while if only biscuit ware is wanted the kiln need not be heated to the high temperature necessary to the formation of a salt glaze.

The production of these results in the shortest time with the least possible consumption of fuel is the task undertaken by the burner. Many difficulties and opposing influences beset him and, like Christian, he must surmount them all if he would reach the goal at last. If the ware is damp when set in the kiln he will need to be careful in the early stages lest he crack some pieces or injure the color of others. If he fires too slowly he not only loses time but consumes more fuel than is necessary. If he fires too fast he heats the ware on the exposed side faster than the other, thereby causing unequal expansion and consequent cracking, or he forces the drying and thus injures both texture and color. If the wind is blowing the draft will be stronger and the fires will burn faster while the increased flow of air through the kiln tends to carry away heat. If the wind ceases he must reduce the supply of fuel and admit more air to carry the heat from the furnaces into the kiln

and thus prevent overheating near the fires. The amount of fuel necessary and the condition of the fires should vary as the burning progresses and the judgment of the burner is taxed to decide what is needed at each stage. If the fires are too hot during the last hours of burning the ware may be melted, thus losing its shape and becoming discolored, if not hot enough little or no progress will be made. If the kiln is closed too soon much of the ware will be too soft, if not closed soon enough part will be burned too hard. Since it is impossible to get a uniform temperature throughout the kiln, parts must be left softer than is desired while those nearest the fires will be slightly overdone in the attempt to bring those most remote to the desired temperature. Judgment must be exercised in order to strike the best mean between the two extremes. When the burning is finished and the kiln is to be closed the experience of the burner is again called into requisition. If the kiln is closed too closely while very hot and there is a quantity of unconsumed fuel in the furnaces the confined heat may injure some of the ware. If the kiln is not closed closely enough there will be a current of cold air through the ware that will carry heat away too fast and much cracked and "shaky" ware will probably be the result.

With these facts ever in mind the greatest care and best skill should be employed in burning. The best kilns should be used and they should be attended by the most faithful and intelligent men engaged at the works. Only an intelligent man can ever become a successful burner. He who heedlessly tries again and hopes to "have better luck next time" should be given some other work. The man who carefully watches the work and notes each step and the results; who examines the kiln while it is being drawn and marks the condition of the ware in each part, is in possession of experience that will go far towards insuring him "better luck next time."

Since the composition of clays is so variable and the possible styles and conditions of kilns infinite, no fixed rules for burning can be given and a burner's experience only relates to the clays and kilns with which he is familiar. Those who burn one clay successfully would probably fail ignominiously in their first attempts with another, while he who is ripe in experience with one style of kiln would be a novice with another.

Effect follows cause and will continue to do so while the laws of nature remain immutable. If the clay-worker is not successful in burning his ware there is a reason for it that he may discover if he will investigate the matter earnestly and intelligently. If the fault is in the kiln it should be so changed as to remedy the defect. If the burner is incompetent he or the incompetency should be removed. A careful, intelligent study of the defects will lead to the discovery of the cause and when this is known the remedy may certainly be found. Industry, intelligence and ingenuity, are traits of the successful clay burner, and he who would succeed in this field of labor must expect "no excellence without great labor." He must bring brains as well as brawn to the task. By so doing he will show that there is no such thing as luck but that the forces of nature may be subdued and made to do the will of man.

BRICK MANUFACTURE NEAR CHICAGO.

BY D. V. PURINGTON.

In complying with your request for a brief description of the methods in use by the Purington-Kimbell Brick Company for making brick, I wish it distinctly understood that the Company makes no claim that these methods are original, or that they are exclusively their own.

There are several other firms who have adopted the same process, some of whom have more expensive plants, and some whose yards excel ours in convenience of arrangement. I do feel, however, that I have the right to lay claim to being the pioneer in the use of the Chambers' stiff mud machine, which has achieved so complete a success, in Chicago. The first machine of this kind was erected by Messrs. Purington & Kimbell, the predecessors of this Company, in the early spring of 1882.

It was placed on a yard that the previous year had operated seven horse-power machines of the kind so generally used along the Hudson River. The clay used was dredged from the Chicago River, and one season clearly demonstrated the impracticability of its use on the Chambers' machine. Taken as it was from the water, it required at least a year to dry out sufficiently to be available. The experiment was carried far enough, however, to prove that the hard, tenacious, blue clay which underlies our whole city,

Read before the American Society of Civil Engineers, April 18th, 1888.

could be advantageously worked in its normal condition.

In June, 1882, Messrs. Purington & Kimbell secured another location on the banks of the Illinois and Michigan Canal, and located a second machine, designing to use the clay that had been dredged from the canal twenty-five years before. From its long exposure this clay was peculiarly adapted to the machine, and in the fall of 1882, the first machine, with engine, boilers, dryers, etc., was removed to the canal bank.

These two machines, one with dryer and one with out-door drying, made in 1883, 1884 and 1885, forty-six millions of brick. The maximum was ten millions on the machine with dryer and six millions five hundred thousand on the out-door yard. In the spring of 1883, this Company was incorporated and purchased the interest of Messrs. Purington & Kimbell, and, the clay becoming exhausted, purchased 47 acres of ground on the Rock Island Railroad, 14 miles from Chicago, and in the spring of 1886 erected thereon the works you have asked me to describe. The wisdom of going so far away from the city and endeavoring to compete has been clearly shown by the fact that the Company are able to deliver brick by rail to Chicago, and by teams to the building at a less cost than they had been able to do it from the yard in the city limits. The railroad company named the new station "Purington," and hereafter in this letter the new location will be known by that name. The clay here differs somewhat from that at or immediately around Chicago. It is much freer from limestone pebbles, and less of the consistency of india rubber, but it is very hard, although slightly granulated.

For the first six months it was obtained by the use of pick and spade. It was found impossible to secure eleven men who could mine and load sufficient clay for forty-five thousand brick in a day of ten hours. As the season advanced, and the bank became dryer and harder, dynamite was freely used to assist in "getting a fall of the bank." In July of that year our bills for dynamite amounted to \$85, and our average day's work less than we had made since the introduction of the Chambers, and we came to the conclusion that unless some more economical plan was devised, the Company would go the way of dynamite.

Correspondence was opened with the manufacturers of steam shovels, and a contract made for one. At this point we

committed the blunder that has been the bane of so many brickmakers, viz.: of trying to economize by getting machinery too light for its work. The expert who knew just what was needed, (?) insisted that a No. 2 was ample for our wants. Four weeks of worry and bother decided that we had saved at the spigot and lost at the bung, and we were glad to make the best terms we could in exchanging for a larger one. This one was built with a dipper intended to hold $1\frac{1}{2}$ yards, but, on our suggestion, was changed for a 1-cubic yard size. It requires 2 yards of clay, measured as dug, in the cars, to make one thousand brick.

Our shovel will easily dig enough for two hundred and twenty-five thousand brick in ten hours, inclusive of time consumed in moving, etc.

The dipper cuts from 4 to 5 inches in depth, 3 feet in width and 25 feet from bottom to top. This cut will ordinarily fill the dipper with clay, thoroughly mixed, cut in small pieces, and the two yards are taken from the bank and placed in the car in less than one minute's time. The cars are drawn from the shovel to the turn-table, a distance varying from 100 to 700 feet, by horses. Until the present year, our cars have been of the style in general use by railroad contractors, a box holding 2 yards placed on a half circle for a dumping rocker. The entire weight and strain comes upon one point, a line drawn lengthwise through the center of the car. I have found in dumping from the steam shovel, or in drawing these cars over an uneven track, that there was a great liability to breakage. I have now adopted the plan of dumping or tipping the track. The frame-work of my track is made of oak, 4 inches by 6 inches in size. Under this frame is placed a shaft 3 inches in diameter, with three bearings in each length of 16 feet, with the car fastened securely to the track. The operation of emptying the clay from the car is simple, and it is almost impossible to break anything. Under the old system (Cockrell) one man was kept steadily employed repairing cars. The cars are drawn up by a hoistway from the turn-table to the machine house.

The contents of the cars are dumped upon a platform, below which stand two pulverizers, one for each brick machine. These pulverizers have never—and probably will never—come into general use, for the reason that so few clays, can be successfully worked by them. With us they seem to fill the bill

exactly. The object of the machine is to tear the clay to pieces, by a sort of whittling, its chips resembling in shape and condition those obtained in sharpening a lead pencil. It consists of a hollow vertical cylinder, at the bottom of which is a revolving horizontal disk, moved by a vertical shaft, connected above to the motive power. In the horizontal disk are set a number of knives in the same manner as the knives of a plane, but with the cutting edges up. The slots in the disk in which the knives are set are also similar to the openings in a reversed plane. Underneath the machine is a belt conveyor. The top of the cylinder is on the level of the floor on which the clay is dumped.

It is the work of two men to shovel the clay from the floor into the cylinder when the disk is revolving two hundred and fifty times in a minute. The idea is to plane the clay in chips, pass it through the slots, and deposit it on the belt or elevator. It is then carried to the hopper over the brick machine. Around this hopper is a platform on which stands a boy, whose place it is to see that the hopper does not clog, and to add what water is necessary.

The brick machine is in charge of one man, who should be a tolerably good machinist, as well as a careful man of good judgment. The bricks leave the machine on the flat, but are immediately edged automatically. Three boys, from fourteen to sixteen years of age, take the brick from the belt and put them upon an iron car, each car containing five hundred and forty bricks. These cars are then taken by a man and run into the tunnels to dry.

There is nothing new or original about these tunnels, unless it is their length, 94 feet, and the use of an exhaust fan instead of a stack to remove the steam. Eleven tunnels, with a 30-inch fan for each two tunnels, will thoroughly dry fifty thousand brick in twenty-four hours. I am a decided advocate of artificial circulation to bring artificial drying to a point anywhere near perfection.

These tunnels should be filled before any are drawn out, and when a car is drawn it should be replaced by another. The grade is 1 inch to 10 feet. One man is sufficient to keep the fires in good condition, to draw out the brick when dry, remove ashes, etc.

In front of the storage tracks is a wide-gauge track with a transfer car, on which the cars of dried brick are run to any portion of the 1,100 feet of kiln shed.

Four men, who still retain the designation of brick wheelers, take the product of each machine to two setters. Our average for each machine in 1887 was forty-four thousand three hundred for each ten hours. I have given in detail the men actually engaged in making the brick and setting them in the kiln. As there are so many men whose work is divided on the whole four of our machines, I submit herewith the list and classification of our employes at Purington. I refrain from giving the wages paid, as that would vary in different localities and really does not enter into this comparison.

- 4 machine men.
- 4 " boys on platform.
- 8 men at pulverizer.
- 2 " hoisting machines.
- 1 engineer on steam shovel.
- 1 fireman "
- 1 craneman "
- 6 men in clay bank.
- 12 boys loading cars, handling cars, etc., with green brick.
- 4 men to put cars in dryer.
- 4 " fire dryers and take cars out.
- 4 " " " " " "

[at night.

- 24 " setting and wheeling.
- 1 engineer.
- 2 firemen.
- 1 carpenter.
- 1 blacksmith.
- 3 laborers.

83 Total.

Thus it will be seen that eighty-three men and boys make, dry and set in the kiln an average of one hundred and seventy-seven thousand two hundred brick per day.

From 1883 to 1885, with one machine used with dryers and one with out-door drying, our average was one hundred and sixty-seven days for the latter and two hundred and fifty-four for the former. The cost of brick dried artificially is less than those dried out of doors. The longer the season and the steadier the job the better the grade of men who will seek it. I have refrained from entering into a detailed description of the Chambers machine, for the reason that it is too well known to brickmakers to need it. This Company pays every two weeks, and during its existence has never missed a pay day and never had a strike. Since its location at Purington, no intoxicated man has ever been seen on or about its premises. Its relations with its employes are never strained; and, while neither the Company nor men make any claims

to foresight or sagacity peculiar to themselves, they do claim to have that perfection of an organization known as a union of the employer and employed. During the past year the Company erected a building 28x40 feet for the exclusive use of the men. They furnish heat and light, and the only restrictions placed upon the men are, that it shall be closed at 10 p. m., shall be kept clean and orderly, and that no intoxicating liquors shall ever be taken into it.

From a portion of the above it may be inferred that the executive officers of the Company are fanatics on the temperance question. This is not the case, but they are fanatical on the intemperance question.

The question of burning brick with crude oil has engaged the serious consideration of this Company for a year past, although it is only three months since their first experiments were made. The developments thus far in this new branch of a science, so all important to the brickmaker, are too crude and new to warrant any extended remarks. All who have tried it agree that as a fuel it comes nearer perfection than any other they have tried or known of, except it be natural gas.

All who have looked into the matter at all agree that hot oil, hot steam and hot air are necessary. No two agree, as yet, on the necessary quantities of either or the proper method of mixing them. I have now burned six kilns or about two million one hundred thousand brick. Thus far we have not had a bad kiln, and my experience justifies me in saying that I feel much more certain of a good burn than I ever did with wood and coal. The cost of burning with us is 35 per cent. less with oil than with wood and coal, and with large kilns the cost of labor is much less; two men will easily handle a kiln of twenty arches. No cold air is admitted and the checked, cracked arched bricks resulting from such admission are avoided. It is a promising field for experiment, and within six months, if we meet with no drawbacks, I hope to be able to write and talk more intelligently in regard to it.

In reply to questions Mr. Purington said: "My drying tunnels are 36 inches wide by 48 inches in height, and the average amount of coke used during the past two years in drying brick in twenty-four hours has been one ton to fifteen thousand brick. This coke costs me f. o. b. cars at Purington, \$5.55 per ton. The expense is about equal to anthracite

coal at \$6.25; but I prefer the coke for the reason that the gas in the coal is more destructive to the iron cars. I should, perhaps, have mentioned that I have a steam dryer that, with a few changes, I think will accomplish better results than the hot-air dryers. Of this, however, I prefer to write when I am satisfied what it will do. In a general way, let me say there are many clays that can be successfully dried with a steam heat that cannot be with heated air passed over or through a heavy fire. While I regret very much that my time is too fully occupied to write as intelligently or exhaustively as the subject deserves, I desire to congratulate the progressive clay-worker that a body like yours deems our avocation of sufficient importance to give it so much attention. I have given to it seventeen years of the best of my life, and feel that I, with others who have tried so hard to place this industry in its proper place among the mechanical arts, have reason to congratulate ourselves that we are in the future to have the active co-operation of your Society.

ALUMINUM.

A few years ago, an American patent was obtained for the reduction of alumina to its metallic form by the intense heat of an electric furnace. A good degree of success crowned the enterprise, at least so far as the production of an alloy with copper at a fair price. This is one of the most valuable forms in which this new metal can be used. Recently a patent has been granted in Switzerland for a process similar to that secured by the American patent, differing only in its details.

This Swiss furnace is operated by the largest dynamo ever constructed, giving double the electric quantity of any machine ever before used. But the current is of low tension, it being the object to use the electro-chemical quality of the immense current rather than its dynamic property. By this means it was hoped to separate the pure metal from its oxide directly. In this, however, the theory failed, but the giant furnace produces the alloy with copper with wonderful facility. The daily production of 10 per cent. aluminum bronze is reported to be about 7,000 pounds—equal to 700 pounds of pure aluminum.

Every experiment strengthens our faith in the ultimate success of the introduction of aluminum, in some of its forms, into common use as one of our most valuable metals.

The power that runs this huge dynamo is estimated at 1,000 horse-power. It is furnished by the river Rhone.

THE POTTS DISINTEGRATOR AT THE FRONT.

The invention and introduction of the Potts' Disintegrator to the clay-working industry was a new departure in the preparation of clay for the manufacture of many kinds of clay goods. "Nothing like it" had gone before. It was unique, original and distinct. In fact, it was the first machine ever offered to clay-workers that would thoroughly pulverize the clay, which is done by cutting and dividing the clay into fine particles. The clay after passing through the Disintegrator is in the best possible condition for tempering; an open, uniform mass, soft to the touch and thoroughly mixed. Clay when passed through rolls alone, is compacted into cakes and difficult to temper evenly throughout, leaving here and there hard lumps with the best tempering or pugging that can be done. In the use of the Disintegrator the best possible separation of the clay is effected.

excellence, efficiency and capacity of this remarkable machine:

OFFICE OF
BERLIN BRICK COMPANY,
Manufacturer of
Pallet Building and Pallet Sewer Brick.

BERLIN, CONN., May 6th, 1889.
Messrs. C. & A. Potts & Co., Indianapolis.

GENTS—We have much pleasure in informing you that your Disintegrator has worked in an entirely satisfactory manner and done all you claimed it would do since we commenced using it this season. We have geared it so that the rolls make respectively 13 and 800 revolutions per minute and it throws out all stones, thoroughly pulverizes the clay and more than that, feeds the brick machine which we are running at the rate of 13 moulds per minute. We have already manufactured some 800 M brick this season and they are considered by all who have seen them to be superior to any others manufactured in this section, for which superiority we give credit to the Disintegrator.

It does not wear faster than could be expected, considering the work it has to do and we certainly think it is the best ma-

olis, Ind., (see their ads. on pages 354, 355, 358 and 359), solicit correspondence from all clay-workers and will cheerfully mail descriptive circulars to any of our readers.

THE MANUFACTURE OF SEWER PIPE.

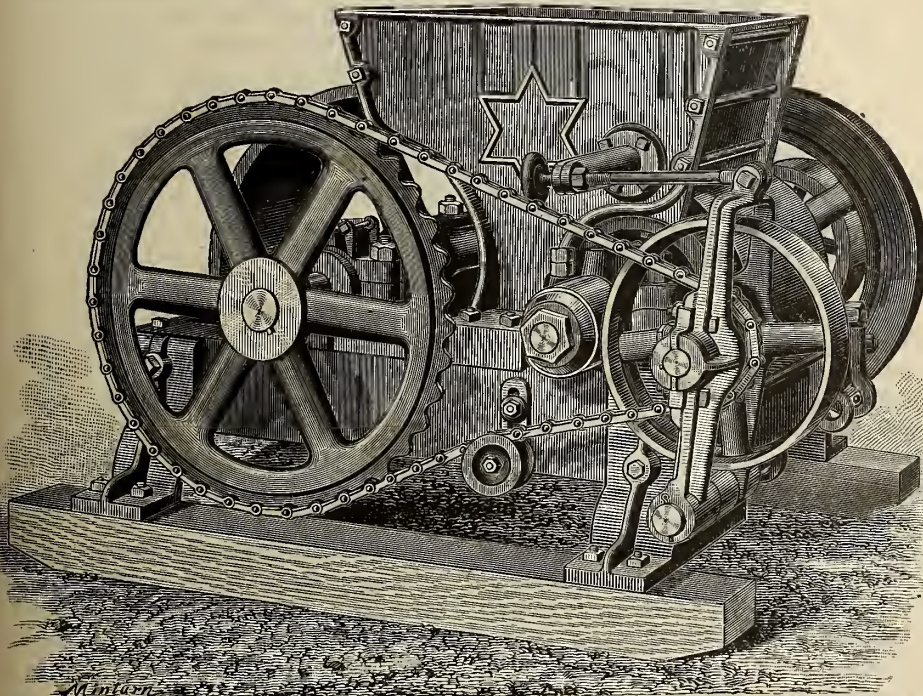
The following is a description of the method of manufacturing sewer pipe followed by the Delaware Terra Cotta Co., as given by Mr. Frederick H. Robinson before the Engineers' Club of Philadelphia:

The works are situated on Brandywine Creek, between Herald and Eleventh Streets and close to the Philadelphia, Wilmington and Baltimore Railroad. They are equipped for the manufacture of all the standard sizes and shapes of sewer pipe, as well as of other work in terra cotta, and of fire brick.

The material of which the pipe is made is composed of three ingredients—two kinds of clay and a sand and clay mixed. The first is a very strong clay obtained from brickyards in the north-eastern part of the city. It underlies the clay of which bricks are made. The second is a strong clay containing a red coloring matter, and is obtained from the south side of the Christiana River in New Castle Hundred, near the bridge on which the Delaware Railroad crosses the Christiana. The third ingredient is a material composed of fire clay and sand is obtained on the Christiana River in New Castle Hundred. These ingredients are mixed in the proportion by measurement of two parts of the strong clay first mentioned, one part of the clay containing the red coloring matter and one part of the fire clay and sand; made in these proportions, the mixture is placed in the pan where water is added. The wet pan is a shallow, circular iron pan in which the clays are crushed and mixed by two iron wheels following each other on edge around the pan, driven by a horizontal axle attached to a vertical shaft. This pan is placed on the ground floor.

After the materials are properly mixed, this clay is turned by a suspended shovel into the buckets of the elevator, which are attached to an endless band in which it is raised to the third floor of the building.

Projecting from the third floor toward the second, is the casting which contains the iron mould for the pipe. Into this the clay from the wet pan is thrown and an iron plunger, moved by the piston of a



The result has been so satisfactory that other manufacturers have tried to devise machinery that would do a like effective work but in vain.

The Potts' Disintegrator has been improved so as to make the working complete but in no sense has the original principle been abandoned. It has been a success from the beginning and with the added improvements it stands to-day without a rival.

The accompanying cut illustrates the Potts Disintegrator, Style "A."

The following testimonial attests the

chine of its kind in the market.

As to your Mould Sander, we can only say that we could not ask for a machine that is nearer perfection both as regards simplicity and efficiency. It does not and cannot leak. The moulds do not and cannot clog or catch, and we are satisfied with it in every way.

You are at liberty to use this in any way you may see fit and we shall be pleased to answer any inquiries, or show the machine at any time to any one you may send here.

We are,

Yours Truly, BERLIN BRICK CO.

The manufacturers of this machine,
Messrs. C. & A. Potts & Co., of Indianap-

steam cylinder, which piston is attached to the upper end of the plunger rods, descends vertically, compressing the clay in the mould below.

After the clay is thoroughly compressed in the mould, an iron table under the mould, attached to the upper end of a piston passing below the second floor and forming, as it were, the bottom for the mould, descends with the pipe standing upon it. The alternate upward and downward motions of the piston which moves the plunger, and the piston which moves the table, are controlled by the operator on the second floor, where the pipes are removed from the mould.

Pipes under five inches in diameter are, when taken from the mould, immediately removed to another part of the second floor where they have placed in them a wooden frame of the proper length to which their ends are trimmed off and then smoothed with leather. As those over five inches in diameter come from the mould, they immediately have their spigot ends trimmed off and are then taken by an elevator to the first floor where their ends are finished up. These, with the smaller pipes from the second floor are placed on end on the drying floor of the first story of the building, where they remain from three to six days, when they are ready for burning.

Branches are made by placing the branch piece, while damp, upon the main pipe and then trimming and shaping them.

Traps are formed by hand in plaster of Paris moulds which are made in halves, dividing lengthwise.

The walls of the kilns are of brick and are 13 inches in thickness. The kilns are circular, the largest being inside, 22 feet in diameter and 8 feet high to the square, mounted by a dome.

The kiln is filled with pipes from the drying floor placed on end. It is fired from eight fireplaces at equal distances around the kiln. Gas coal is used. Inside the products of combustion pass through short vertical stacks toward the top of the kiln, whence they are beaten back among the pipes and finally escape through a flue built around the kiln near the bottom and pass in an underground flue to the stack.

At the proper stage of burning, which is ascertained by small test pieces of clay which may be drawn and examined, the attendant passes three times around the kiln and each time throws into each fireplace a shovelful of common salt. By this the pipes are glazed.

After the sealing of the kiln, three days are required in which to fire up and burn, and three more in which to cool off and remove the pipes which are inspected and are then ready for the market.

THE J. M. BLAIR BRICK CO'S WORKS NEAR CINCINNATI, OHIO.

The following brief notes made during a recent visit to the extensive brick works of the J. M. Blair Brick Co., together with the ground plan illustrated, will doubtless be of interest to our readers. They are making this year some 20,000,000 brick for the Cincinnati market and vicinity. Last year their product was 13,000,000 when they were burned out. But with their characteristic energy they have rebuilt their works and resumed operations early this season.



Their works embrace all modern improvements and the arrangements in some respects are unique. They were rebuilt under the direction of B. W. Blair, the General Manager of the works, and who will be remembered as one of the efficient Vice-Presidents of the National Brick Manufacturers' Association. Above we present to our readers the portrait of this well known gentleman to whom we are indebted for courtesies shown during the visit as well as at other times.

Mr. Blair, however, is disposed to give credit in part, for the plan of the present works to May, Purington & Co., of Chicago and acknowledge special obligation to C. S. Purington of that firm for valuable aid and suggestions in planning their new works. The Blair Company have 80 acres of excellent clay (they claim the finest clay in the world) thirty feet deep situated on the Ohio River, at Blairville (the name of their place) twenty miles above Cincinnati.

The clay is dug and loaded on dirt cars with a Marion Steam Shovel digging

clay enough for 110,000 brick per day supplying two Chambers Brick Machines and the shovel is idle a good part of the time. The clay in cars is drawn by a mule to an elevator made by the Link Belt Machinery Company, of Chicago. The Elevator consists of a series of pans on wheels that run on tracks from the clay bank to the granulator in the top of the building. The pans of the elevator interlock and form an endless trough which can be stopped or started at will by means of a friction clutch on pulley that runs elevator, so that if the granulator is full of clay the feeding from elevator can be discontinued. Mr. Blair informs us that the elevator is a great improvement over elevating the cars into the building. From the elevator the clay passes into the granulator where it is thoroughly cut up and prepared for the pulverizer or crusher into which it next passes. And they claim that here is one of their *greatest improvements*, that of feeding with *one large* crusher, two large Chambers Machines and supplying them with clay for from 110,000 to 150,000 brick per day, which is done by means of two inclined planes under the crusher, an inclined plane running to each machine. At the top of inclined planes there are two doors on hinges. When one machine is to be fed the doors are thrown back to receive all the clay for that machine. When two machines are to be fed one door is thrown to receive one-half the clay of the crusher from machine and the other door thrown to receive the other half of the clay for the other machine. From the crusher (which is ten feet above the brick machines) the clay falls into the hopper of the brick machines and comes out on the other end beautiful bricks.

The Messrs. Blair dry a part of their brick on a large dry floor 120x120 feet (square) having a drying capacity of 50,000 brick per day; another portion of their brick are dried in tunnel driers having a daily capacity for 35,000 brick and in summer a third portion of their brick are dried by the rack and pallet system with capacity for 40,000 brick per day. On their yard each of these systems of artificial drying is a success.

Mr. Blair says that since using the granulator in conjunction with a crusher or pulverizer, the quality of their brick in smoothness and squareness has been improved one hundred per cent. There are no lumps now in the brick. They ship most of their brick to the Cincinnati market on their own barges each of which holds 140,000 brick. They have

sent, though, during the past few years 1,300,000 brick to Ironton, 140 miles up the river from their works; 1,200,000 to Maysville, 60 miles from works; 1,400,000 to "Addyston," the new iron works 30 miles down the river from their works, so that their product is in general demand not only at the local market of Cincinnati, but far away where they

of young men, I wish to say that whatever of success in life we have attained, it had its foundation in reading agricultural papers when I was young. And I find it is not too late to profit thereby, as we find many valuable hints which we can utilize; for instance, we have been constructing a 12-inch sewer over 100 rods long about nine feet deep to drain

perience that they cannot utilize at once to their profit and say "its no use," "its book learning," &c. Such people are quite ready to say "it don't pay to take and read a paper" and so they go through life, stumbling and catching here and there. Now and then they point to Jack Jones or Billy Smith and say with a degree of ignorant pride, "See what he has done; he can't read, even." We reply that there are men fitted by nature to hoard up their daily earnings until they amass wealth, like many other animals that we can name which pile away nuts for winter, that are of little benefit to mankind. But who can tell what Jack Jones or Billy Smith would have accomplished in life if they had had a liberal store of information from daily readings.

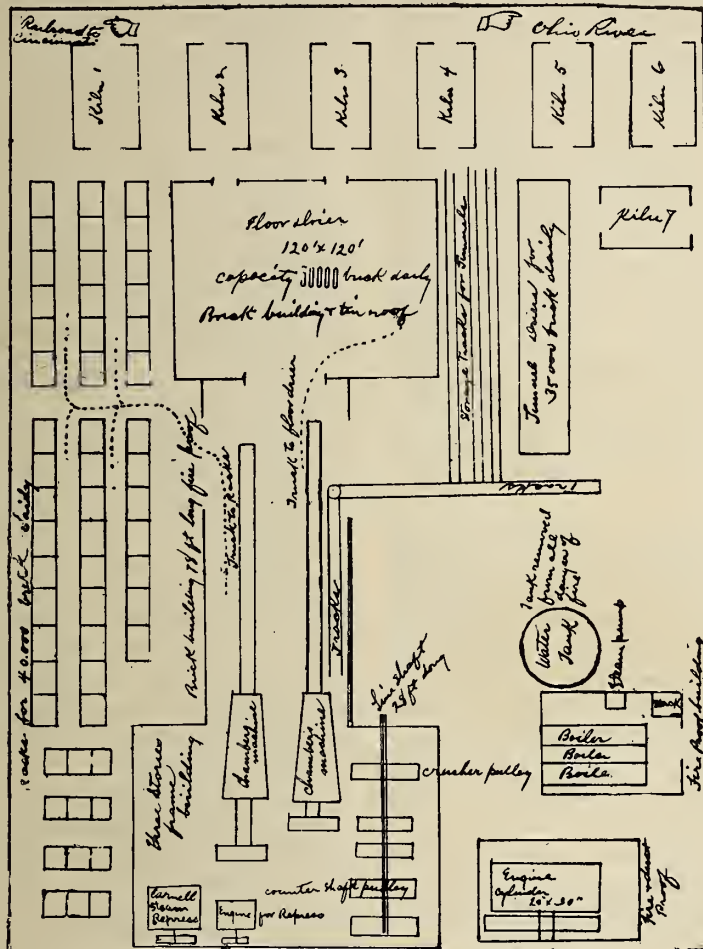
A valuable suggestion may not be needed for years but when it is, and is utilized, it may be worth many dollars—it may be the key to success in the supreme moment.

Again, we hear it said "there is Prof. Wiseman, he is a walking library and he can hardly keep soul and body together." Very well, that may be. Men may have capital and fail to use it. Better that than to have no capital to use. The world is badly mistaken, sometimes, in its measure of men. There be some that the world judges to be failures because they fail to make money, when, in fact, they are of incalculable value in the uplifting influence they have upon society in another and infinitely higher sense.

But the rule is, that information acquired by using the leisure moments in reading valuable papers or books will inure to the success of sensible people.

The Soldiers' Home at Leavenworth, Kans., are preparing for the extensive manufacture of brick this season and are erecting large works. Col. A. J. Smith, Governor of the Institution recently made an extended trip for the purpose of investigating the different machines manufactured, and placed orders for the machinery. The machinery selected was a Penfield No. 10 D, with pug mill, four roll crusher, elevators, dry cars, barrows, etc., all purchased from Penfield & Son. They will also use a Penfield steam Dryer. They expect to manufacture paving brick, also building brick, hollow building material and ornamental brick and are now busily engaged erecting their machinery and buildings.

A city girl exclaimed, on seeing a watermelon growing: "My! I always s'posed watermelons grew in the water."



would expect opposition, except only for the superiority of their product.

After spending a pleasant afternoon with Mr. B. W. Blair, we reluctantly bade him good-bye, being satisfied from his conversation and the results we saw that he had made a thorough study of modern brick manufacturing.

THE VALUE OF TIMELY READING.

We had occasion quite recently to write Mr. J. W. Penfield for some facts in regard to the progress of tile drainage. After briefly reviewing his early experience, how he first learned of the under-drainage of land by reading the Gennessee Farmer, the Ohio Farmer, American Cultivator and Greeley's Tribune, he says: "To illustrate the value of Agricultural reading and for the encouragement

a valuable clay bed recently purchased, and having read in the Drainage Journal a hint from some one about covering the joints of large tile with tar paper to prevent dirt from entering, we tried it and find it of great service. We had a bed of quicksand full of boiling springs and a large quantity of water to go through, and when we wrapped the joints with tarred paper we excluded not only the quicksand but most of the water—a very desirable thing to do where the drainage of the land through which the ditch passes is not desired."

Information acquired by reading when we have a leisure moment is so much capital to be drawn on in the future when the occasion arises demanding its use. Some people think their time wasted if they read a suggestion or ex-

CORRESPONDENCE.

THESE COLUMNS ARE OPEN TO ALL. THE FULL NAME AND ADDRESS IS REQUIRED BUT WILL NOT BE PUBLISHED EXCEPT WHEN PERMISSION IS GIVEN BY CORRESPONDENT. THOSE DESIRING TO COMMUNICATE PRIVATELY WITH ANY CORRESPONDENT WHOSE FULL NAME IS NOT GIVEN CAN DO SO BY ADDRESSING LETTERS CARE OF CLAY-WORKER.

Up the Hudson.

Editor Clay-Worker:

The making of brick in Haverstraw began unusually early this year. Pursuant to instructions from headquarters I paid a visit about the middle of April to the little village situated so picturesquely on the Hudson, and found that matters were much further advanced in all the yards than could reasonably have been expected by the most sanguine. There was only one yard not in operation when I called, that of Sherwood & Baum, and this fact was due not to the weather or to the men, but to some unexplained trouble about the lease of the premises.

No one who has never paid a visit to Haverstraw can have any idea of the way in which the brickmaking industry has wrapped itself up in the destinies of the little town of over 6,000 inhabitants, more than half of whom earn their living in and about the yards, nor of the immense size and importance of the industry. In and around Haverstraw from the Hook mountain, which is about opposite Sing Sing on the east side of the Hudson, and near Rockland Lake, to Grassy Point, which is opposite Crugers—an area of about three miles—no less than between 350,000,000 and 400,000,000 of brick are produced yearly. Of the immense amount of capital invested there is no need of speaking. Each yard represents thousands of dollars, and from the fact that the brickmakers are the capitalists of the town directing the destinies of the banks and other moneyed establishments, it is easy to draw the inference that the industry is in a flourishing condition.

The first yard that I visited was that of John Derbyshire, whose regular quota of men in the busy season is about 55. The full gang was not yet on but molding was going forward briskly. About 60,000 brick a day are turned out here, eight million being the output for the season. It is a four machine yard and is held to be one of the best equipped along Haverstraw Bay. Wm. R. Pitts, the Superintendent, escorted me about, and I was much struck with the simplicity of the covered yards. In cases of sudden rain, the three levers can be used to advantage in shielding

the bricks in less than five minutes. An ingenious contrivance in use here in case of fire is the placing of a valve and nipple on every other post, or every sixteen feet throughout the covered yards. These connect with hose, and in case of the eaves catching fire, the brick can be flooded in a moment. New machines—two of Wiles' and two of Vervalen's, were put into these yards last season and as a result no changes are to be made this year. The blue clay deposit from which the Derbyshire yards are kept going, is exactly on a line with the village and is said to be the greatest deposit of the kind in this part of the country. There is four feet of yellow clay and the rest of it is solid blue. When an artesian well was sunk here some years ago it was found that 110 feet of the 165 sunk was all solid clay. As it is, the vast amount taken away already can hardly be noticed and Mr. Pitts told me that even if the capacity of the yards were increased to 12 million bricks yearly the deposit would surely last for 50 years more.

"The opening this year of our yard and of all the yards along here," said Mr. Pitts, "has been much earlier than for a number of years past, and I think that we have every prospect for a very favorable season. There never was a time when there was such a scarcity of brick at the opening of the season, and since 1870 I have never seen so many new buildings projected as there has been this year."

From Derbyshire's I went a little below the village to Denton Fowler & Son's yards. Here I found both of the firm, who are old subscribers for the Clay-Worker, and enterprising and experienced brickmakers, hard at work putting in their new covered sheds. They had started up molding on the 16th of the month, with about 70 or 75 men, their full force consisting of about ten men more and their output consisting of between 80,000 and 100,000 brick a day. Five Vervalen machines are in active use here. Last season the firm tried the pallet system of laying the bricks in racks, but this year they will try covered sheds, which, in spite of the extra expense, will, they think, work better in the end.

Theodore Frederick, whose yard is above that of John Derbyshire, started in early this year, with about 50 men, which is a little less than the regular force. Mr. Frederick is a regular subscriber to the Clay-Worker, and seemed

to be fully up to the times. He has invested between \$2500 and \$3,000 this year in a new plant, pit and tool sheds, and he expects to put up other new sheds soon. Seven millions of brick a year, or about 22,000 daily, is the regular output, and the three Vervalen machines are kept going steadily. One of the three machines is new and the facilities of the yard for turning out better brick have been increased.

Mr. Frederick in common with a number of other brickmakers has recently put in the city water, which is a great improvement over that of the river, as it leaves no scales on the boiler nor eats into the iron as the salt water does. He also has the fire sprinkling system which is in use at Derbyshire's.

Next to Mr. Frederick's yard, as one journeys up along the Hudson is that of Dolan & Co., where moulding was begun on the 10th of April. The regular force here is about thirty and four or five millions are turned out annually by the two Vervalen machines which are in constant use. Both of these machines are new this year.

T. Maguire & Sons started in on the 15th with 60 of their 85 men at work. They have eight yards and five Vervalen machines which have been put into perfect repair for this season's work. Eight millions is the regular output here, but 12 and 13 have been turned out during good years.

Among the first yards to open up this season were those of Murray & Morrissey, which adjoin Maguire's. The regular force here is forty men and six million brick are made annually on two machines.

Archer Bros. keep 40 men at work and of the six Wiles machines which were running when I called, two are quite new and contain all the latest improvements. Fifteen millions is the yearly output.

At Snedeker Bros., whose yard adjoins Archer's, I found that the pallet system which had been put in last year was warmly praised for its effectiveness and that it was to be continued. This firm has 25 of its regular force of 40 men at work. It runs two machines and turns out between four or five millions every year.

The first yards to start up this year were those of Peck Bros., where work was begun on March 27th. It proved to be a little too early, however, and the force had to lay idle for a full week after starting, while the frost lasted. Forty

out of the regular force of fifty men were at work, and here again the pallet system was giving perfect satisfaction. Two machines are kept steadily at work and the output is about 75,000 brick a day. Here I learned that the most needed improvement and the one which Mr. Frederick and others of the brick-makers had adopted, was the use of reservoir city water, instead of hydrant city water. This improvement had only been made by the officials of the place this winter and that all Haverstraw will soon be using it is of course a matter of little doubt.

At the yards of B. J. Ellison & Co., which opened up on the 16th, the shafting and machinery has this year been put into thorough repair, while of the regular force of 100 men, 80 are hard at work. This place keeps 5 machines going steadily and turns out twelve millions of brick every year.

On March 27th, the same day that the Peck Bros. started up, work began at the yards of Bennett, Warren & Scott, and when I visited them I found that they were already burning brick in the kilns. No less than 140 men are kept at work here regularly and fully 23 million brick are made yearly. To the five machines here the firm are adding patent mould sanders this year.

The two yards of A. W. Keenan and of Ward & Keenan adjoin Bennett, Warren & Scott's. They began moulding on the 16th inst. and 36 of the regular force of 50 men are at work. The four Vervalen machines in use underwent a general repairing before the season opened.

After passing Keenan's yards one arrives at the yards of the largest brick-making concern in Haverstraw—The Diamond Brick Co. This is a stock organization. Ira D. Hedges, who is also the President of the National Bank in the town, is the President, Geo. H. Smith is Treasurer and W. H. Carr is the Secretary. The company is a regular subscriber to the Clay-Worker, and Mr. Carr is one of the best known brickmakers in the country. Over half of the regular force of 400 men started into work on the 16th of April and matters were progressing favorably when I made my visit. This is the only establishment of its nature in Haverstraw that burns oil and I am credibly informed that it introduced that factor into the art of brick-making. A large tank near one corner of the yard has a capacity of 3,000 barrels and the company is finding the use of the oil a saving. Twenty machines are

now run here and the annual production of the yards is between 45 and 50 million. At the three separate yards of Richard Crowley, Thos. Dinan and Dennis Maguire, work had not begun when I called as the men were busy putting in a new engine and boiler to be used by all three firms. It was expected that the yards would start about May 1st. Altogether they have a capacity of fifteen millions yearly.

D. Fowler, Jr., & Co's yards opened up on the 15th of April, six machines being kept steadily at work here, and the output averaging from six to eight million.

Near Grassy Point, where I brought my tour of investigation to a close, I found the three yards of M. F. Washburn the scene of much activity. Considerable repairing had been done before the opening of the season and one of the old machines had been replaced by a new one. About 175 out of the regular force of 200 men were at work and I learned that the 11 machines in use turned out an average of 19 or 20 millions of brick a year.

Back of Grassy Point and between that place and West Haverstraw, on the banks of the picturesque Minnesonga Creek, which is a branch of the Hudson, two new yards are going up. One of these will be run by Washburn & Fowler on the pallet system. It will contain five machines and turn out 9 million brick yearly. The other will be that of Sharkey & Sons and will be a four machine yard with a capacity of eight or nine millions. It will also be run on the pallet system.

BRIC-A-BRAC.

Another Way of Burning.

Editor Clay-Worker:

I have been reading the letters in the Clay-Worker with considerable interest and would like to say a few words about burning. I notice that no two burners burn alike, and although I don't claim to have better plans than anybody else, I can get good burns by the following methods:

Begin water-smoking by placing two pieces of split wood in each arch and kindling fire on them. Fire slowly for eight or ten hours, then increase the fires sufficiently to start water-smoke rolling all over the kiln. When the top of the kiln shows water-smoke to be leaving the heads, begin working the fire to the center, but keep a little fire in the mouths of the arches and continue this until the kiln is entirely water-smoked and in good condition for heating. Be-

ing ready to turn one side we put a couple of pieces of wood in each arch and close the head, then fill the mouths of the arches on the other side, placing a sheet iron door aside of each arch. We fire slowly and widen the draft so that in about twenty-four hours the arches will be hot two-thirds of the way across. Hold to required heat until the head is down and the settle will slope across the center. After changing, fire last head slowly for six or eight hours until the draft is up next to the casing, then widen and burn same as on first till done. We build kilns with a slow draft and never close the mouths of arches unless there is a gale of wind or we want the fire to burn down ready for rustling.

I thought I would be generous to the public last year and make larger brick, using moulds 8 9-16x4 3-16x2 5-16 in size, but have got enough of that and have ordered new ones the old size, namely 8½x4½x2 9-32 inches. J. H. H.

Astoria, Ill.

The Village Brickyard.

Editor Clay-Worker:

Some twenty odd years ago a friend of mine in the brick business, in working over his field, had several poor burns from a certain north corner of the land caused, his burners stated, by the peculiar quality of clay in that portion of the yard.

At another time my father scalped the sod off, and leaving six inches of soil to mix with his four foot bed of clay, the foreman claimed so weakened the clay as to make all the arches melt, and so, in the experience of nearly all of us, instances are reported wherein the silent clay is variously vilified and all because that same clay has not been questioned in a manner and by a means by which it is capable of telling the truth. To show how important it is to appreciate the truth, that in the mud is only dormant, waiting to be questioned, my friend above named worked out his bed and abandoned the business because of the above poor burns, leaving the 30 acres adjoining his old corner, (which I am now working,) as worthless. Yet to-day I am making better brick than he ever did, with almost uniformly good arch brick, and have his hearty congratulations freely extended thereat.

As well known, when we have a case in court it is to our interest to employ a lawyer in order that all the witnesses may be properly questioned, for it is one of

the most difficult feats in life to make another man tell the truth, the whole truth, and nothing but the truth.

Well, we are in the business of burning clay; we want to know if it will make good brick, or rather, as we have brick to sell, and of course they are good and first-class in every respect, we want to know if our clay field is not capable of making a better brick than our neighbors are able to produce, and then we shall have a better chance of trade than they have.

In a former communication it was stated that a burned brick made from an average of all our various clays, weighed 75 ounces, and that our brick mould was $4\frac{1}{2} \times 9 \times 2\frac{3}{4}$.

The following samples all made in the same mould and burned near the center of the kiln, show some points of general interest to the craft:

Sample No. 1. Clay two feet under ground, pure, medium to strong, brick $8\frac{1}{2}$ inches long, weight 77 ounces and quality suitable to pave, with fair ring. Our own yard.

Sample No. 2. Clay two feet under ground, rough, slaty, dark red, with probably a large proportion of iron, brick $8\frac{1}{2}$ inches long, weight 87 ounces and thoroughly vitrified. Other samples of this clay set in our arches entirely mis-shapen and full 9 inches long. Clay taken from an abandoned brick district in northern New Jersey.

Sample No. 3. Bank sand six feet deep; a fine, rich yellow sand used by us for moulding common brick; brick length $8\frac{3}{4}$ inches, weight 56 ounces; quality, weak and rotten. Sand from under our clay beds.

Sample No. 4. Clay three feet under ground, strong, smooth, pottery clay; burns pinkish white; brick $7\frac{1}{2}$ inches, weight 72 ounces, and quality a strong, perfect metallic ring. Our yard.

Sample No. 5. Rich garden soil from clay land, brick length $8\frac{1}{4}$ inches, weight 63 ounces; quality, weak metallic ring; medium strong brick. Our yard.

All the above samples burned in Philadelphia, open top kiln. Of other samples of the same clays set in the rounding of the arches, all stood the fire without any indication of slag except No. 2, noted above.

From these samples and others made in a similar manner, I have learned that our clay will take an addition of fifty per cent of the sand that under it occurs; that all the top soil left on and mixed with the clay has no appreciable effect

on the quality of the brick, and that neither our top soil or sand will make our clay more liable to slag. Here we have brick weighing 77, 87, 56, 72 and 63 ounces each, all made the same size, burned the same quality, in the same kiln, only differing in material. The 56 and 63 ounce undoubtedly make weaker brick, but it is very important for us to know that both will make brick—that neither will slag in the fire—and hence when the burn is poor that it is not the clay's fault or our fault, but the fault of the man who neglected his fire—went to sleep, woke up, and tried to make a big show of doing something by morning when the boss might be around. Very often the silent clay is made to slag, when, if we could see the truth, the slag would be very close under a man's hat rim.

A VILLAGE BRICKMAKER.

A Letter From England.

Editor Clay-Worker:

One thing surprises me much, that you, with your very large number of splendid advertisements, don't publish an English edition of your paper with a view to bringing American machinery before the English brickmakers. I will give your machinery men credit for producing some exceedingly useful machines, and I believe they would sell in the English market if they could compete in price with the English makers. Some of the dry clay and semi-dry machines are especially useful tools, and I think are superior to the bulk of the English-made, and turn out more bricks. There are also some very handy plastic, wire cut machines (which you call stiff mud machines), and I believe they would sell readily. But in your cutting off tables you are a century behind us. In England you would find hundreds of tables somewhat similar to those advertised by you, out of use. How it is your machinery men produce such handy machines and old, obsolete tables, I am at a loss to understand. Now, I know I shall get rapped on the knuckles for this, and your machinery men will say I "have an ax to grind," but they will be wrong, all the same.

Some years ago a gentleman named Murray patented in England a cutting off table, and this table is now in use in nearly every wire cut yard in England. "Ah! that fellow is Murray's agent, and gets a commission on the sale of the table," is what your advertisers will say; but they would be wrong again. Murray's patent has expired and there are fifty places in

England at the present moment where these tables are made, and anybody can make them. They are known as a side delivery table, and cut off and deliver on a board, ten bricks at once, without any handling at all.

To a plastic wire cut brickmaker, this table is worth its weight in gold. It would be of no use for slush machines or dry clay or semi-dry clay.

Your makers also manufacture some very good pipe making machines, hand-brick presses, stock-brick making machines, slush machines, all of which would sell if the price was right. But there is one great thing to consider; the salesman must know the brick trade and must understand the districts in which the various sorts of clay is found. For instance, it would be no use trying to sell a dry clay or semi-dry clay machine in Essex, Kent, Sussex or Middlesex, because there is no clay there that will grind, and it would be folly to try and sell a slush machine in Staffordshire, Worcestershire, Lancashire or Yorkshire, because the clay is not suitable; neither would it be any use to take a plastic wire cut machine on the South Coast. A salesman must understand the geology of the district before he knows what machinery to recommend.

One of your advertisers (Chambers Bros. & Co., of Philadelphia) had one of their very good and useful horizontal plastic machines in the American exhibition in London, but they made one mistake—their salesman was an American and did not understand the language of the English brick trade. I spent close on three hours with him one afternoon in the exhibition, and had it not have been that I had read the Clay-Worker I should not have understood what he meant. He talked about stiff mud machines, slush machinery, spiral cut offs, automatic cut offs, tempering devices, sanding chamber, etc., all of which was Greek to an ordinary English brickmaker who would be too proud to show his ignorance by asking what he meant. There are square miles in the midland counties of England you could not get a brick sanded on the outside if you would give its weight in gold for it, and square miles in the southeast of England where you could get very few but this sort.

Now, Mr. Editor, I am going to have a shot at you. How is it there are so few brickmakers and clay-workers advertisements in your paper? Surely very many large brickmaking firms manufacture

fancy bricks, ornamental squares, trusses, finials, ridge tiles, chimney pots, drain pipes, stable floor bricks, gutter tiles, &c., &c., and issue to their customers illustrated pattern sheets. Why don't you follow the example of the English Pottery Gazette and distribute these pattern sheets by stitching them in the Clay-Worker and charge a certain sum per 1000 for the distribution? These pattern sheets would get into the hands of thousands of people (architects, engineers, draughtsmen, builders and others) where the makers themselves could not hope to get them, besides saving them the cost of postage. Oh! Mr. Editor, I thought all Americans were sharp.

Now, if you fall in with my suggestion and publish an English edition of the Clay-Worker, you ought to get a lot of English advertisements which, as a matter of course, would be published in both England and America, besides bringing the English and American brickmakers closer together and make them understand each other better. R. S. BLUCK.

Peterborough, England.

A Promising Field.

Editor Clay-Worker:

We are running a brickyard at this place with capacity for manufacturing eight to ten million brick per annum and have a rapidly increasing demand. Our yard is located on the banks of the Mississippi River and on the line of the L. N. O. & T. R.R., "Mississippi Valley Route" giving us good shipping qualities. We make nothing but the ordinary building brick which burn to a beautiful cherry red. The nature of the clay is mentioned in an article by Jno. W. Cray in your April number. We are having a constant enquiry for pressed brick and ornamental work for facing and building fronts. There is also a growing demand for tile such as that used by farmers and planters for drainage purposes. They have just commenced using it and soon the demand will be very heavy.

Our brickyard tract covers about 300 acres of land immediately adjoining our city and we are desirous of organizing and starting a stock company for the manufacture of the different clay goods referred to above, but the difficulty that we labor under is that we have no one in this section experienced in the manufacture of that class of goods. We desire to correspond with any experienced party who would like to go into an enterprise of this kind, we furnishing one-half the

necessary capital. Of course it must be understood that the party or parties who will go into this business are experienced in the manufacture of these goods and shall come here to take the management. What we have reference to is the manufacture of repressed or facing brick, ornamental clay work and drain tile.

GARIG, REDDY & HART.

Baton Rouge, La.

Standard Size for Bricks.

Editor Clay-Worker:

The St. Louis Iron & Machine Works, in establishing a special department for making moulds for dry clay brick presses find some annoyance in the fact that the sizes of brick differ materially in different cities and often are not alike even in the same neighborhood. Such diversity makes it impossible to carry moulds in stock and as most people never order anything until they find they cannot do without, the delay in manufacturing is often serious. Considering that bricks are largely shipped, it would seem that uniformity of size is of the greatest importance.

Letters of inquiry on this subject brought the answers given below. Could not the Clay-Worker agitate the question of uniformity?

S.

CITY.	SIZE.	REMARKS.	
		Average.	As many sizes as makers
Cleveland.....	8	2	2 1/4
Boston.....	8	4	2 1/2
Detroit.....	8	4	2 1/2
Portland, Maine....	8	4	2 1/2
Wilmington, Del....	8 1/4	4 1/2	2 1/4
Trenton, N. J.....	8 3/4	4 1/4	2 1/4
Washington, D. C.,	8 1/4	4 1/4	2 1/4
Louisville, Ky.....	8 3/4	4 1/4	2 1/4
Philadelphia.....	8 3/8	4 3/16	2 3/16
Pittsburgh.....	8 1/2	4 1/4	2 1/4
Baltimore.....	8 1/2	4 1/4	2 1/4
Cincinnati.....	8 3/4	4 3/16	2 5/16
Memphis.....	8 1/2	4 1/4	2 1/4
		No standard.	
		No standard.	
		Average.	Some make larger size.

[Our correspondent is probably not aware of what has been done in this direction. The question of establishing a uniform size has been considered and pretty fully discussed by the National Brick Manufacturers' Association and the following size recommended: 8 1/4-in. long, 4-in. wide, 2 1/4-in. thick which

was referred to the consideration of the National Association of Builders, and we have been informed that the latter Association also recommended the adoption of the above size for common brick. Both Associations have further recommended that face brick be made 1/4 inch thicker. The adoption of the above size depends now on architects, builders and brick manufacturers. If the architects will make their estimates and so far as they can, specify this size, and the builders and contractors require, so far as they can, the delivery and use of these sizes, and brick manufacturers make them except where the demand for the other sizes are imperative, the use of uniform sizes will speedily be brought about.

The manufacturers of molds will be confronted, however, with the difficulty of having the shrinkage of the clay to provide for. The difference in the shrinkage of clays will require different sized molds to secure a uniform size of brick when burned. Brick manufacturers before ordering their molds must determine by practical tests the shrinkage of their clay and order the requisite size to secure the size of brick desired when burned. We do not see how the use of standard sizes can be brought about otherwise.

Ed.]

Information Wanted.

Editor Clay-Worker:

There has lately been developed here, 100 feet below the surface, a 4-foot vein of red shale or bolus, suitable for the manufacture of mineral paint. We have pulverized it and find that it mixes well with oil and makes a fine body of paint. It has also been tried in a pressed brick machine and makes a beautiful red brown brick; very heavy, perfect in shape and rings like steel.

Under this red clay is three feet of white, or rather a light pea green, which looks like kaolin and is a plastic or molders clay. Either one of these clays after being moulded as soft as putty will harden in three hours without the aid of any artificial means, as hard soap stone.

Now what we want to know is this: Will this clay work well by the Dry Process? We should also like to hear from your correspondents as to the best machine and manner of pulverizing the clay for red paint and the best machine and manner of working it for brick. We should also like to know the nature of the white clay, how to work it and what it is most valuable for. L. E. MONSER.

Supt. Wenona Coal Co., Wenona, Ill



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men will always be welcome. Address all
communications to

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14 & 16 S. Tenn. St., Indianapolis, Ind.

IT IS HARD TO GET THE RIGHT MAN.

Turn, turn, my wheel! Turn round and round,
Without a pause, without a sound;

So spins the flying world away;
This clay, well mixed with marl and sand,
Follows the motion of my hand;
For some must follow, and some command
Though all are made of clay!

—Longfellow.

How to get the right man to command
is a difficult problem. The inquiry comes
again and again, "do you know of a good
man to take the superintendency of our
works?" Such men are wanted and
wanted bad, all over the country. They
are invaluable—treasures not picked up
every day. Competency to superintend,
manage men successfully and do it with-
out any trouble, do it smoothly, without
any friction; manage them to the best
advantage, getting each to do his part
and do it at the right time and in the
right way. There are such men, but they
pretty generally have places; are not out
tramping for a job.

There are those that are, in a manner,
born to command others and do it well;
that can get men to follow the motions
of the hand as clay does to the hand of
the potter. Incompetency to command
is a curse to any works. The sooner
such are discharged the better it is for
the success of the business. It is quite
frequently the case that the proprietor
can, or could, select a quiet, faithful
workman, one who is familiar with the
work in its details, and put him at the
head, on trial, and in this way secure
just the man so much needed.

A friend in relating his experience
along this line, said: "My superintendent

was fussy, dictatorial and harsh. There
was frequently wrangles among the men.
Some were out of place and out of joint
apparently; the work did not progress,
there were many mishaps and annoy-
ances until I could stand it no longer.
I said so in plain words to my superin-
tendent. He thought I could not do
without his services, and in fact, I had
been of that opinion myself, but in the
heat of my passion I had made up my
mind to have an end of such out of joint
business, not expecting to get rid of my
superintendent; but when he tauntingly
said 'Maybe you had better try it your-
self.' I said 'I will, or will get some one
that will;' not knowing where to turn to
make my words good. The superintend-
ent went away expecting that I would
follow him up, at least he said I would.
But I determined that I would not if it
stopped the works. After a few mo-
ments study as to what I should do in
the emergency; I thought of one of the
men who had been a day laborer about
the works for two years, quiet, easy-going,
but always ready to do when he under-
stood what was wanted. It occurred to
me that I would get him to overlook the
work until I could get another superin-
tendent, and went at once and called to
him to come into the office. He came
in. I said, 'Joe, you know how everything
is done about the works, don't you?' 'Yes,
sir, I suppose I do.' 'Well,' said I, 'can't
you oversee the men until I can get an-
other man?' He was surprised until I
explained matters, then he said, 'I will
try if you say so.' Well, I said so, and
told him to do what he could, distribute
the men to such points as he thought
best until we could do better. I called
in the men at the close of the days work
and told them that for a time Joe would
superintend them, and they must under-
stand that his word was law. In two or three
days there was a change about the works
and that, too, for the better. I could see
it—I looked on. I soon saw that he was
the man I wanted. I would not need to
advertise for one in the Clay-Worker,
and I didn't. And I tell you for a fact,
I would not change him for any one in
my knowledge. It is simply in him to
get the most with the least friction I
ever saw."

So it is, there are men about us quite
often that if raised to the dignity of the
position of superintendent develop a
competency for the place we never
dreamed of. They prove to be orderly,
even tempered, judicious, careful and so
unusually in commanding the services of

those under them that they remind us
of the clay in the hand of the potter at
the wheel, "it follows the motion of the
hand."

"For some must follow, and some command,
Though all are made of clay."

THE COPYRIGHTING.

A contemporary indulges in a deal of
word painting, condemnatory of the copy-
righting of the proceedings of the
National Brick Manufacturers' Associa-
tion—says "it's not American," etc. It is
awfully horrible not to be "American."
The Executive Committee ought to have
consulted the oracles before doing this
thing. What of it, anyway? Well, yes;
it prevents publishers from using the
proceedings or any part thereof without
giving the necessary credit. The giving
of the proper credit brings the Associa-
tion and what it has done into more
general recognition. That is all there is
of it. Our contemporary is at liberty to
string out the proceeding in its own col-
umns throughout the next quarter of a
century, if it wishes to, provided the
proper credit is given.

The copyrighting is very much like
the "chip in the soap" symbol—the soap
is just as good with the chip and just as
good without the chip.

The proceedings are just as good with
or without the copyrighting. It will be
eminently American to use them *with
proper credit*.

WHY THINGS SHOULD BE KEPT IN ORDER TO SELL OR NOT.

The extent of the manufacture of brick
and drain tile, the number engaged in
the business, necessarily embraces very
many who wish to sell or change loca-
tions. Men grow old and feel the need
of retiring from business activity. Others
find themselves burdened with more
business than they can well attend to.
Again, others find themselves financially
embarrassed on account of unexpected
losses or reverses from outside business.
And very many have families growing up
around them that they would like to see
settled favorably in life, which, as they
think, makes it desirable to select a lo-
cation where they may lay a broader
foundation.

From these, and other causes, there
are many who wish to sell the whole or
a part of their interest in the business.
But how to sell to advantage is the per-
plexing question? On this line we make
the following suggestions: The first thing
in order is to put the works in order.

How much this simple suggestion has to do with selling to a good advantage can scarcely be overestimated. A little effort in this direction will be repaid many times over. People will judge of the prosperity of a business in most part by outside appearances. No amount of talk will overcome it, altogether. A tile or brickyard in a tumbled down condition leads a would-be purchaser to distrust the expediency of a purchase. Tile and bats, boards and poles, remnants of one thing and another scattered here and there, and a general want of order will discourage the best of purchasers.

Flattering advertisements or other favorable words of representation are powerless when parties come to look at the works. A few days spent in the general righting up of things will often work such a change that some party near by may be induced to invest money in the purchase of the whole, or part of an interest in the business.

In almost every community there are those who are quite ready to take hold of laudable enterprises if they can be led to believe that it will pay. Besides parties from a distance will make the appearance of the works largely the basis of their judgment. The works will talk for themselves; it makes but little difference how much is said or how well said more than this, if the general appearance of things are unfavorable.

Before offering to sell put your works in order by clearing up the rubbish, repair where neat and inexpensive repairing will add to the general appearance of things. Cart the bats out of sight, make the entrance to the grounds attractive. If there is a stock on hand put it in neat order and convenient of access. Rub up and oil the machinery. There are a hundred little touches that will add to the general business-like appearance.

When all this is done and a general business activity is taken on, some one not far away may be attracted by the orderly appearance of things and become a purchaser; or, if the works are advertised for sale, parties coming from a distance will be disposed to consider the possibility of a purchase. It will cool the expectations of anyone who may come from a distance in response to a flaming advertisement or favorable representations through personal correspondence if they find things in disorder. Besides, every good citizen ought to have enough personal pride to make him keep his works in order for his own credit and

the credit of the neighborhood. It will lead to prosperity in business. Men like to go where there is order in business. They like to trade where everything in sight is in place and of some utility in its place. Do not say it is of little use to expend time and labor on these little things. To the contrary, it is important. Order has an educating influence; it leads to better business methods; it promotes better business growth; it is helpful to others, and if it is desirable to make a sale of a business it paves the way to it. In short, it is a good investment of money and labor to make and keep things in order.

MISREPRESENTATION.

In the report of the proceedings of the Iowa Tile, Brick & Drainage Association, made by the Brick, Tile and Pottery Gazette, Mr. Billingsley, the senior editor of the Clay-Worker, is reported as saying:

"But little of the so-called fire-brick are more than common clay. Some are hard, others are soft, and all will melt at even a moderate temperature. True fire-brick are very scarce in this country, and are so soft that even the flames of a furnace will wear them away. Until the recent discovery of genuine fire-clay in California, English fire-brick were the only ones known in modern times, at least, and the rest of the so-called fire-brick of this country are but weak imitations of the true article."

WHAT "MR. BILLINGSLEY" DID SAY.

The subject of street paving was under discussion, some of the speakers in the course of their remarks referred to the use of a good article of fire-clay brick for pavers, we said, substantially that the best fire-clay brick were not suited for pavers—that they were too soft—that there were many grades of fire brick, some of which were made in part of potter's clay. That in California they claimed a superiority for their fire-brick over English fire-brick (which they had formerly used for smelting furnaces)—that they would stand an intense degree of heat and not wear so badly by the flame—that a good quality of common clay with a mixture of part fire-clay and then burned to almost a flinty hardness would make good pavers, that the fire-clay would serve to preserve the form under the necessary degree of heat—that there were excellent clays in Iowa, both fire and common clay, for the manufacture of paving bricks—that we had seen some very fine grades of fire brick made from Iowa clay, and referred to some brick

that we had seen made at Indianola, Iowa.

It never entered into our brain to say, that "until the discovery of genuine fire-clay in California, English fire-brick were the only ones known in modern times," etc. We have visited too many fire-brick establishment in all parts of the country East and West, North and South, and have acquainted ourselves with the clay industries of the country too fully to make any such a wild statement. But we will say now and here, in cold type, that there are cheap grades of fire-brick that are little superior to the best grades of common clay.

Again in the same report we are credited with having read the "paper read for him before the National Brick Manufacturers' Association." The truth is, that the Convention on the first day of the meeting requested us to read a paper on brick paving, with the provision that if we did not have the time to prepare a paper we might read the one referred to. But we prepared a paper that evening suited to the locality—quite a different paper, both of which have been published in the Clay-Worker, and our readers can judge for themselves as to the truth of our statement.

Our sanctum was honored recently by the presence of Mr. Daniel E. Ryan, of New York, who, our readers will remember, has favored us with some very interesting communications describing some of the brick yards he has visited in the past few months. Mr. Ryan has been traveling through the Central and Western States on a tour of inspection with a view of informing himself as to the best and most improved methods of brickmaking and the most desirable and successful machinery. He feels well paid for the time and trouble expended and being a close observer has acquired much practical and valuable information which we trust he will, in part, at least, impart to our readers in future communications. Mr. Ryan is especially pleased with the kindly reception tendered him generally by the craft. At nearly every yard visited a hearty welcome has been extended and every facility offered for a thorough examination of the methods and machinery in use. This, we believe, is the experience of every one who present themselves in a proper and business like manner. This spirit of fellowship and co-operation is growing broader and deeper and is among the most favorable signs of the craft's progress.

EDITORIAL NOTES and CLIPPINGS.

Sac City, Iowa, is to have a brick and tile factory.

Africa & Co. have started a brick yard at Jellico, Tenn.

A. J. Hill is fitting up a brick yard at Whittingham, Vt.

Lay & Co. have started a brick yard near Winona, Miss.

W. J. Walker will start a brick yard at Marshallville, Ga.

Bond & Halsey have started a brick yard at Auburn, Cal.

The Mackay Brick Co., of Austin, Tex., has been incorporated.

C. L. Dill will start brick and tile works at Dillburgh, Ala.

M. Fite contemplates starting a brick yard at Cattaraugus, N. Y.

Jno. Burnett has started brick and tile works at Lake Charles, La.

C. L. Alexander & Co. have started a brick yard at Brimfield, Mass.

Edge & Huber, of Allentown, Pa., had a \$500 fire at their brick yard recently.

A. E. Townsend & A. J. Cline have started brick works near Hickory, N. C.

W. H. Stewart, of Rock Hill, S. C., will start a brick and tile factory at Yorkville.

The Kearney (Neb.) Brick Co., are arranging to use crude oil for burning, etc.

F. W. Farquar, of Ensley, Ala., contemplate the erection of a machine brick plant.

The Troy (N. H.) Brick Co. will put in another machine thus doubling their capacity.

It is reported that an extensive bed of valuable fire clay has been found at Lancaster, O.

The Mackay Brick & Tile Co., San Antonio, Texas, has been incorporated. Capital stock \$75,000.

Chas. Philips, of Columbus, Ga., contemplates going into the fire brick and terra cotta business there.

McGowan & Hollingsworth are starting a brick yard at Arrow City, Md., and may also make drain tile.

W. J. Kerr and others, of Pueblo, Colo., have purchased an interest in the Fire Clay mines at Canon City and will start a factory for the manufacture of fire brick.

The Lexington (Ky.) Brick Co. are burning with crude oil and are much pleased with this new fuel.

A. L. Hawks, of Saccarappa, Me., has put up a Chicago Iron Clad Brick Dryer, with which he is well pleased.

The Kiesel Fire Brick Co., Kitney, Me., has been organized by E. T. Wilson, Farmington, N. H., and others.

A. C. Spain & Co., Darlington, S. C., are increasing the capacity of their yard by the addition of new machinery.

The South Florida Brick, Tile & Terra Cotta Co. will increase their capacity by putting in another brick machine.

Stephen B. Quigley, of the firm of S.B. & A. M. Quigley, brickmakers of Mobile, Ala., died April 18th, aged 71 years.

A. K. Barwise & Co., of Pueblo, Colo., have organized a company for the manufacture of brick by the dry press process.

John Lyth, the well-known sewer pipe, tile and terra cotta manufacturer of Buffalo, N. Y., died April 27th, aged 69 years.

The stoneware pottery of Thomas Bros., near Cuyahoga Falls, O., was burned the 8th inst. Loss \$6,000. Insurance \$4,000.

A very extensive deposit of brick clay is said to have been discovered recently near Welshton, Fla., and works are to be erected there.

A subscriber at Saco, Me., writes that the brick interests in that section are prosperous and a largely increased demand is expected.

Camp & Thompson, of Akron, O. have purchased a complete outfit for a soft mud brick yard from Messrs. C. & A. Potts & Co., Indianapolis.

Harmon Brown and Geo. E. Waldorf, brickmakers, of Palatka, Fla., have dissolved partnership. The former will continue to run the yard.

Jno. W. Mason, R. W. Kennedy, Chas. Teeters, J. C. and W. J. Painter, have organized a company to manufacture fire brick at Thornton, Taylor Co., W. Va.

After "staying out" three weeks the striking brickmakers, of Baltimore, Md., have accepted the reduction of 10 and 15 per cent., making wages the same as in 1885.

The Collins Brick Co., Atlanta, Ga., has ordered machinery for plant with daily capacity of 160,000 common brick and will probably make pressed and fancy brick also.

Terpening Bros. & Brunk is the firm name of the company who recently started a brick and tile factory at Prairie Grove, Ark., with a capacity of 10,000 brick and tile a day.

The Middlesborough (Ky.) Brick and Tile Co. has been organized with capital \$25,000. W. H. Kinnaird, Pres., J. E. Stormer, Sec'y, and I. C. Thompson, Treas. A plant will be built at once.

J. D. Hoff, of San Diego, Cal., has been experimenting with a combination of clay and asbestos and claims that the results are very satisfactory producing a fire brick that is superior in fire resisting qualities.

The Ontario Terra Cotta, Brick and Sewer Pipe Co., Toronto, Canada, has been incorporated. They propose to make pressed brick and tile extensively near Milton, on the C. & P. R., where they have an immense deposit of fine clay.

Messrs. Pike & Castle, of Chenoa, Ill., have favored us with a neat 10 page circular giving information relative to the New Discovery brick and tile kiln. From

the many flattering testimonial letters from brick and tile makers who are using the "New Discovery" it evidently continues to grow in popular favor.

The buildings of the new Chelsea White Ware Pottery, at New Cumberland, W. Va., have just been completed and the work of putting in the machinery is now in progress. The works are said to be the largest in the world. They expect to commence operations in about three months, giving employment to 300 men.

We are indebted to Mr. Alfred Crossley for a copy of his new illustrated catalogue of Brick Machinery, Etc. This little book is evidently an importation, as it bears the unmistakable features of a foreigner. Much of the machinery illustrated will be new to most of our readers, any of whom can secure a copy by addressing Mr. A. Crossley, Ironton, O.

The Eureka Brick Machine Mfg. Co., of St. Louis, Mo., write that they are having a busy season being unable to build machines fast enough to supply the demand promptly. They have therefore arranged to manufacture the new Improved Eureka on a larger scale and hope thus to keep up with their orders, and add: "We attribute a great deal of our success to the Clay-Worker."

J. Q. Adams & Sons write, that they have sold their plant at Fayette, Mo., and have located at Birmingham, Mo., nine miles from Kansas City, where they are putting in a new plant, including one No. 3 Adrian Brick and Tile Machine, 40 h. p. engine, made by Chandler & Taylor, 60 h. p. boiler, steam dry house 60x80 feet, with racks and pallets. They will depend on Kansas City for a market, and will begin running about May 10th.

C. W. Raymond & Co., of Dayton, O., are constructing an entire new plant which they will occupy by July 1, 1889. They will also have almost a new line of wood and iron working machinery, together with special tools adapted to their work. Having built additions to their present shops every few months to keep pace with their growing trade and exhausted their limit of space, they will move to a new and larger location as indicated above.

There is a case before U. S. Judge Blodgett, Chicago, to determine the duty on glazed tiles designed for interior decoration only. The importers claim that they are dutiable only at 20 per cent. as paving tile, but the government authorities assessed them 55 per cent. as "glazed earthenware," and this decision was sustained by the Secretary of the Treasury on appeal. The difference on the duty among the various importers interested in this question is said to have amounted to nearly \$10,000.

The King Hill Brick Co., of St. Joseph, Mo., will manufacture paving brick extensively this season as there is a large and increasing demand for this ware in their vicinity. They will also manufacture a large variety of ornamental brick, hollow building material and building brick, and are erecting a Penfield No. 10

D Machine and Horizontal Pug Mill in their works, and arranging their works for a steady run. Indications point to a large demand for brick for paving material this season and the western cities especially are beginning to appreciate the advantages of brick as pavers.

Mould making for dry clay brick presses has grown to be a specialty closely connected to the rapid strides the dry clay presses are making in public favor. The St. Louis Iron & Machine Works, of St. Louis, Mo., have gained such a reputation for superiority of moulds through their Lion press, that they found it necessary to operate a special department to fill the many orders for moulds wanted by presses of other makes besides their "Lion." A letter to them from the Calorific Brick Co., at Kansas City, speaks for itself: "We have made over *eleven million* brick in your last mould and are using it again this season."

Michigan Brick and Tile Machine Works, Morenci, Mich., say: "In the last two weeks we have shipped one No. 2 machine and Potts Disintegrator to B. Erickson, Bridgeton, N. J.; one No. 2 combined machine to John Freehouse, Sunfield, Mich.; one No. 1 and 2 to Reidale Bros., Chaska, Minn.; one No. 6 "Special" to Morrison & Son, Minneapolis, Minn.; two Little Giant Represses to Frey-Sheckler Co., Bucyrus, O.; one patent Side-Cut Brick Table (capacity 75 M per day) to R. M. Hasty, Minneapolis, Minn. We shall ship within the next two weeks one No. 6 "special" to South America, and one to Mexico.

The Lorillard Brick Works, of Keyport, N. J., have been making extensive changes in their plant preparatory to greatly increasing their capacity. The three Penfield No. 10 Machines which were used last season have been replaced by three of the large No. 20 Penfield Machines with complete outfits, including pug mills, and large four roll crushers. In addition to this, they are placing in their works four outfits for the manufacture of sand moulded brick, using the Penfield Upright Stock Brick Machines with direct attached pug mills. This will give them, undoubtedly, the largest capacity of any brick works in the United States.

Jonathan Creager's Sons, manufacturers of the Grand Automatic Brick Machine, note the following recent sales: Grand Junction (Tenn.) Fire Brick Co., complete plant; S. A. Douglas & Co., Covington, Tenn., complete plant; T. B. Townsend & Co., Zanesville, O., second machine; G. R. Franz, Freedom, Pa., one S. P. machine; Camp & Hinton Bros., Lumberton, Miss., one machine; E. Achee, Labadieville, La., one machine; Wm. Busse, Covington, Ky., complete plant; Fox Bros., Willamansett, Mass., one machine; Leach & Ash, Kokomo, Ind., complete plant; New Brick Works, Lancaster, N. Y., two S. P. machines and extra heavy pug mills; W. N. Walker, Kansas City, Mo., complete plant.

M. H. Jodd, one of our subscribers at Hot Springs, Ark., has a fine brick yard with daily capacity of 30,000. There is forty acres of good land and 15 acres of timber. The clay is excellent, one bank being a rare quality, burning snow white and making a fine hard brick. The yard is well equipped with machinery, kilns, etc., and a good dwelling and other buildings. There is a large and increasing demand for brick at \$8 a thousand. For reasons not relating to business, Mr. Jodd desires to dispose of the plant and return to his old home in the North. The location seems to be a very desirable one for an experienced brickmaker and should receive the attention of those desiring to establish themselves in a warm climate.

To keep up with the demand of the age Messrs. C. W. Raymond & Co., of Dayton, O., have constructed a No. 4 Power Perfection Press. It is highly successful as a worker of paving blocks, tiling, ornamentals, etc. Three of these presses are now under construction for one firm for pressing street paving blocks, solidifying, finishing and ornamenting the blocks, doubles their market value. A No. 5 Power Press, weight nearly 4,000 lbs., is also under way, which will be completed about April 1st. It will work a die large enough to press an entire piece of panel work in terra cotta, or the very largest tiling made. This press was built for a New Orleans paving syndicate, but large orders from other sources are indicated.

The Fort Payne Coal & Iron Co., Fort Payne, Ala., with a mineral property of 32,000 acres and a subscribed capital of five millions in addition to their other extensive operations in connection with their coal and iron industries have de-

cided to commence the erection of Fire Brick works at a cost of \$40,000; to this will be added a first-class Sewer Pipe works, plans for which are now being prepared. Other branches of fire clay manufactures will be taken up as quickly as circumstances will permit. It is the intention of the Company to make Fort Payne the fire clay metropolis of the South. Mr. W. Garland Taylor, at the present time Superintendent of the Mt. Savage Fire Brick Works has been appointed to the management.

Mr. E. G. Durant, of Racine, Wis., has invented a building block which has special merit and while he does not expect to revolutionize the building industry, he claims for his blocks adaptability for certain localities. The block is formed by joining by a metal binder two bricks, having concave sides, which form between them a hollow arch which admits of a free circulation of air. The outer wall of the block which forms the front of the building is ornamented in any design, while to the inner surface the plaster is applied direct. The Southern California Water & Sewer Pipe Mfg. Co., of South Riverside, Cal., will manufacture them. They will be made upon the Perfection Brick Press, the company having placed an order with Messrs. C. W. Raymond & Co. for their No. 3.

Messrs. J. W. Penfield & Son of Willoughby, Ohio, report a very flattering trade and are rushed to their utmost capacity to fill orders. They report a large sale for their Upright Stock Brick Machine and although this machine has been on the market for a few weeks, they have already shipped a large number of these machines. The Lorillard Brick Works, Keyport, N. J., are erecting four of these machines and machines

The Link Belt Machinery Co.,

New York, }
Minneapolis, }

CHICAGO, ILL.,
11 to 23 South Jefferson St.

BURR & DODGE,
Philadelphia.

MAKE

ENDLESS TROUGH CONVEYORS,

Adapted to handling (on incline) clay direct from clay-bank, or pit.

METALLIC APRON CONVEYORS,

(Sometimes called clay elevators). Adapted to feed Brick or Tile Machine.

TILE ELEVATORS, (New Pattern),

Will elevate any size up to 18-inch. Send for Prices.

LINK BELT ELEVATORS (using buckets),

Will elevate Semi-Dry or Pulverized clay.

We are prepared to contract for the entire machinery required for a Complete Brick or Tile Works of any capacity.

Send for 1888 Catalogue.

(Mention the Clay-Worker.)

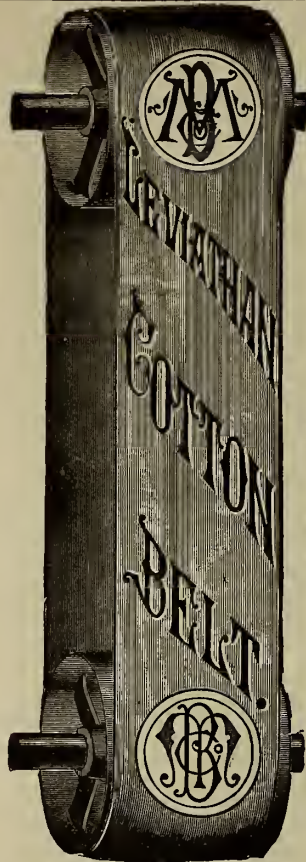
have also been shipped to Philadelphia, Pa., Baltimore, Md., Reading, Pa., Madison, Wis., Royersford, Pa., Worcester, Mass., Northeast, Pa. and other points. The trade on stiff clay machinery, crushers, pug mills, etc., is also very fine. In fact, the firm report that they are too busy to give a detailed list of their sales and shipments. Every indication points to a prosperous season.

A fatal riot occurred on the 5th of May at the village of Washington, N. J. between the brick yard employes of Edward Furman and a gang of Italians employed by the Raritan River R. R. Co. The latter undertook to construct a branch of the road through land owned by Mr. Furman, who opposed the project, as it would deprecate some valuable clay property of his. The agent of the Railroad Co. thought to steal a march on Mr. Furman and so set a gang of 100 men at work laying track Saturday night at 12 o'clock. Mr. Furman was absent at the time but his foreman, Joseph Cathcart, being apprised of the scheme gathered his men and attacked the Italians with clubs and stones driving them from their work. A fearful fight followed continuing from time to time till morning resulting in the death of one of the men from the brick yard and serious injury to many others on both sides. The county sheriff was finally called on to stop the riot.

NEW INVENTIONS.

The following is a list of patents appertaining to brick, tile, terra cotta, sewer pipe, pottery, etc., and the machinery used in their manufacture issued since our last number: (A copy of any of them can be obtained by sending 25 cents, the official price, to Chas. E. Brock, Patent Attorney, 925 F St., Washington, D. C.)

- 400,097. Incrusting Bricks—J. C. Anderson, Highland Park, Ill.
- 400,996. Frame for Building Blocks—B. W. Belden, St. Louis, Mo.
- 400,997. Paving Block—R. B. Berril, Lexington, Mo.
- 401,030. Paving Brick—D. Harger, Des Moines, Iowa.
- 401,172. Furnace for Brick Kiln—C. Keep, Erie, Pa.
- 400,974. Brick—T. Thorn, St. Clair, Pa.
- 400,767. Street Pavement—H. Hallwood, Columbus, Ohio.
- 400,575. Brick Kiln—D. Laemmle, Ft. Wayne, Ind.
- 400,477. Paving Tile—C. O'Connor, Lock Haven, Pa.
- 401,492. Paving Block—G. Graham, Cleveland, Ohio.
- 401,396. Brick Truck—J. Weeks, Fort Worth, Texas.
- 401,836. Chimney—J. Hodel, Cumberland, Ind.
- 401,750. Brick Machine—S. Lasor, Philadelphia, Pa.
- 401,862. Machine for Pulverizing Clay—Jno. Shaffer, Philadelphia, Pa.
- 402,821. Drying Attachment for Brick Kiln—R. J. Gurnee, Rondout, N. Y.
- 402,369. Brick Kiln—E. Von Oven, Napoleonville, Ill.



SOLE MANUFACTURERS.

Main Belting Co.,

Manufacturers of the Celebrated

Leviathan Belting!

WHICH FOR

Strength and Traction Power

HAS NO EQUAL.

Specially adapted for Brick and Tile Machinery.

Unaffected by Heat, Steam or Dampness.

Send for Price List.

Samples sent on application.

Mention this paper.

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Main Belting Co.,

248 Randolph Street,

CHICAGO, ILLS.

NOTE—To any responsible party sending us measures, we will ship a "Leviathan" Belt on sixty days trial; to be paid for if satisfactory.

SEE THE BATTLE OF ATLANTA.

Market St. Between Ills. St. and State House, Indianapolis.

The Kilbourne & Jacobs Manufacturing Co.,

LARGEST MANUFACTURERS IN THE U. S., OF

Bolted Brick Barrows, Mule Trucks, Spring Brick Trucks, Road Scrapers, Wheel Scrapers, Grading Plows, AND BARROWS OF ALL KINDS.



Spring Brick Truck—Steel Spoke Wheels.

Designed especially for handling green pressed brick; also common brick in moulds, and adapted for tile, etc. Wheels bored and axles turned.

Platform, 17x60 inches; height from ground, 22 inches; axle, 29 inches long and 1 1/4 inch square; length over all, 84 inches; wheels, 20 inches in diameter, 2-inch face. Weight 125 pounds. Price \$25.00.

Send for general catalogue.

THE KILBOURNE & JACOBS MFG. CO.

Columbus, Ohio.

THE CLAY-WORKER

VOL. XI.

INDIANAPOLIS, IND., JUNE, 1889.

No 6

EXAMPLES OF AMERICAN BRICK AND TERRA COTTA WORK. No. 16.

THE MERCANTILE LIBRARY BUILDING,
St. Louis, Mo.

The wide, almost national, reputation of the St. Louis Pressed and Ornamental Brick leads one naturally to expect, on visiting that city, to find it built up largely of this, the best of all building materials.

To some extent one may be disappointed to find that like all old cities St. Louis, generally, presents a painted front.

Of late years, however, many large and imposing structures have been erected and most of them are of brick and terra cotta, of superior quality, that is so pleasing to the eye and needs no paint to hide natural deficiencies.

The subject of this sketch, The Mercantile Library Building, is

among the most prominent of these. It was completed in 1888.

The lot on which the old building stood and the new building stands is located on the southwest corner of Broadway and Locust Street, fronting 115 feet on the former and 128 feet on the latter. It cost in 1851 \$25,500, and its value is estimated to-day at \$400,000. The

new Library building, with equipment and furniture, cost nearly \$400,000 more. This building is six stories in height. It is built, as to its principal parts, of granite, brick, terra cotta and iron, and is fire-proof throughout. The style is Romanesque and is treated in a broad, massive manner; the lower story is of red granite,

and girders are of iron, protected by burnt clay tiles; the floors are filled in between the beams with burnt clay, hollow tile flat arches, and the roof is similarly constructed. The library occupies the whole of the sixth floor and one room on the second floor, which has been reserved for the meetings of the directory.

Entrance to the Library is from Locust Street, at the northwest corner of the building. It is of granite work, round-arched, with columns and richly carved capitals and opens into a handsomely furnished vestibule, or reception room, marble-floored and finished on walls and ceiling in paneled and polished oak. From this room a hydraulic elevator of the most approved construction, superbly appointed and running within a brass-latticed frame of elegant form and ornamental design, ascends



THE MERCANTILE LIBRARY BUILDING, St. Louis, Mo.
Henry G. Isaacs, Architect.

with a degree of ornamentation which gives effect to the rough, quarry faced treatment of the granite. The upper portion is of brick, with the architectural members of terra cotta, such as the capitals, bases, and the archivolts of the round arches. A parapet cornice, of brick and terra cotta, crowns the structure. The interior, columns, floor beams,

to the sixth story in twelve seconds, making the descent in ten. A stairway of stone winds upward around the elevator frame and both stairway and elevator open into the issue room. This apartment is floored with marble tiles and is finished in quartered oak, with the walls and ceiling decorated in color.

Written for the Clay-Worker.

BRICKMAKING AND BURNING.

No. 3.

BY JNO. W. CRARY.

I have said in article No. 2, that brick properly made of dry pressed clay, are superior to those made of soft tempered clay. I stated how dry press brick should be made, and my statement was not based upon theory, but upon actual and successful experiment at different times and places, and in different clays. At one place I had charge of a dry press machine that made twenty thousand brick per day of tempered clay, molding by hand. I set and burned both kinds of brick in the same kiln, about half of each. I found that the dry pressed brick "dried off" slower than the mud brick, and the fire was slower in getting out at the top, but after the "fires were up" the dry pressed brick burned out faster than the mud brick, and were ready to be "closed up" sooner, though "fired" the same way, but slower the first thirty-six hours. Those brick were made for the large United States Custom House in New Orleans, in 1850 and '51. The officer in charge came to our yard to inspect the first kiln, which was very thoroughly burned, and though prejudiced against dry pressed brick, after a fair and full test, pronounced the dry pressed brick superior to the mud brick.

This brick yard was on Biloxi Bay, in the State of Mississippi. In 1856 to 1860, I had charge of a company's brick yard on Escambia Bay near peninsula Florida. The concern was making brick for the U. S. Government, under a contract for sixty-five millions, to be used chiefly for the building of Fort Jefferson, "Dry Tortugas" in the Gulf of Mexico. The company at first, made brick altogether by hand—forty thousand per day was the "output." In 1858 we put up a dry press machine, which turned out an average of thirty-three thousand brick per day. Carrying the brick into the kilns on belts and from them "tossed" to the "setters," at the same time we made twenty-five thousand brick per day by hand. I set both kinds of brick in the same kilns. I set them five brick in a "bench" and from forty-eight to fifty brick high, our contract was for first quantity, whole hard brick, and large high kilns turned out the best, we shipped ninety to ninety-five per cent. of our brick to the U. S. Government. I found the same results in the burning, and character of the brick, as I had ex-

perienced before. The clay in both these cases would not melt or shrink in burning, even with fine, light wood fires, which, with a good draught, is as hot as any smelting furnace. The dry pressed brick were tested at Fort Jefferson, and carried fifty per cent. more pressure, than the best mud brick of the best samples that could be found. I have made and burned dry pressed brick, in seven different places. In two, the clay would neither fuse or shrink in burning. In the other five places, one in New Jersey, one in New York, one in Maryland, and two in Iowa, the clay would fuse, "settle" in burning, from four to eight inches, and took twenty per cent. less wood or coal than the infusible clays.

THEORY OF UNITING PARTICLES OF CLAY IN A BODY.

A brick made of soft plastic clay, contains about twenty-five per cent. of water in weight. If the clay be strong or pure and thoroughly tempered, it will absorb about thirty per cent. of its weight in water when tempered soft enough for easy hand molding. It is evident then, that the particles of clay which are infinitesimally small, are surrounded by water to a certain extent so that when a soft brick begins to get dry a partial process of crystallization of the clay begins on the surface, and as evaporation goes on, the crystallization or cohesive attraction increases, until the brick is hard enough to handle, or nominally dry, though theoretically damp.

If we take such a brick and break it, and examine it, we find the particles of clay cohered in sharp edged crystals, but pointed at their angles, so as to allow the water to escape, and leave one compact body but full of pores. We call this a solid, dry brick.

Now if we take a brick of this kind, and put it in a die, and apply one or two tons pressure, it is crushed, if the pressure be increased to ten tons, the particles of clay begin to assume their natural position of cohesion, and as the pressure is increased, cohesion follows in the same ratio, until it becomes perfect, and the brick that a moment before was crushed to a disjointed mass of broken crystals, has now become one perfectly dense, solid body, without a single pore, unless made by confined air. A perfect dry pressed brick, well burned, will absorb but very little more water than a stone, and is about sixteen per cent. heavier than a mud brick of the same size.

THE MAKING OF A PERFECT DRY PRESSED BRICK DEPENDS ON THE CONDITION OF THE CLAY.

We hear of "semi-dry pressed brick." The well informed brickmaker, would call that by its right name, which is "stiff mud," and poorly tempered, because it is impossible to make clay plastic, or compel it to cohere, like well tempered soft clay, by any process of disintegration or co-mixing. "Semi-dry clay," as very damp clay is called, cannot crystallize, it is not sufficiently wet, comminuted and plastic. It cannot be perfectly cohered by pressure, because the presence of a considerable amount of water intervening between the particles of clay, prevent perfect cohesion.

The natural dryness of clay is the right condition.

If clay be spread out in the hot sun, until it appears perfectly dry, it still retains a certain amount of water, and if perfectly pulverized, may be pressed into a solid body; but the moisture is not properly equalized, until sun-dried clay has been at least a week, packed under a shed; then it becomes pulverulent, and easily yields to the action of machinery properly constructed, and a comparatively solid body is made, much more tenacious, hard and strong, and less liable to warp or fuse by heat, than if molded of tempered plastic clay. I know of a clay working manufactory in a large northern city, that tried every possible way, at great expense, to make floor tile to compete with the celebrated "Menton" English tile, out of tempered moldable clay, but failed in every experiment. At length, finding they could not get the secret from the English manufacturers, they were about to abandon the effort to accomplish the enterprise. Just then, they accidentally got one of my circulars, which I had published, to show the theory upon which my dry press brick machine worked, which I had put in operation at Baltimore. Then they pulverized their clay thoroughly, and by means of proper dies and pressure, succeeded in making a first rate floor tile, every one was true, straight, and of uniform size, and hard as steel. I did not know how "Menton tile" were made, until long after I had conceived of, and practiced the same theory.

Dry pressed clay will stand fire much better than tempered clay. In the kilns where I have set and burned both mud, and dry pressed brick, I found the "overhangers" on the "arches," of the dry

pressed brick, perfectly sound and solid, while those of the mud, or semi-mud brick, were cracked and easily broken. I have used dry pressed "overhangers," over and over, ten times, for "overhangers" in the mud brick part of the kilns.

The reason for this difference is, that a dry pressed brick, being more dense than a mud brick, does not heat so fast, or cool off so fast. What constitutes a good "fire brick," is its ability to stand sudden temperatures of heat and atmospheric changes, without fracture, as well as to stand intense heat.

THE PROPER WAY TO SET BRICK IN A KILN FOR BURNING.

I will not in this article, express my opinion as respects the best kind of kilns for brick burning. There are so many different kilns and ideas connected with this business, that it is not easy to make a choice. The main thing involved in the question of kilns, is economy in labor and fuel, "quality" is not a factor of any importance in the construction of a brick kiln. A perfect brick can be burned in an old-fashioned, "cased up" kiln. The great art and secret is, in the setting and burning. No kind of a kiln will turn out a perfect brick, without these capabilities and conditions. We had just as well try to make a forge, that would temper steel, without the hand and eye of an expert.

Brick should be set in a kiln, so as to get the best draught, and combustion of fuel, leave the least fire marks on the brick, and get the best distribution and equalization of heat.

To do all this now, I will take, for instance, an old style kiln to build. I will build the side walls twenty-five feet apart inside, they shall be at least three feet thick at the bottom, and tapered on outside to 18 inches on top. If the clay stands fire well, I will build the furnaces so as to allow a "bench" for "overhangers," five brick wide; if the clay fuses easy, will make the benches four brick wide. Having my kiln ready for "setting," I will set my brick zigzag, or "skintling," so that if two brick are set on edge, one-half inch apart, one brick set on two would cross them diagonally, so as to rest on the outer corners of the lower brick, the divergence of parallels, of upper and lower course, would be, as a rule, one half the thickness of the brick. I will set this bench five brick high, and set them to average half an inch apart. I will then start my "overhangers" and set them the same as the benches. The first binder over

the closing of the "overhangers" I will set close, so as to spread the fire; all other binders I will set loose. Now I will put on the cross, "running course," loose, then I will start over these "cross courses" and if I want solid, even colors on the edges of the brick, I will set two courses one way, brick over brick all the time, before I cross them, thus preventing "fire marks," except when the courses are reversed. I will thus proceed to top of kiln, then "plat" with burned salmon brick, if on hand, if not, will use dry unburned brick. The "platting" should be laid flat, and about one inch apart, so as to leave a good draft and escape for watersmoke.

Written for the Clay-Worker.

HINTS ON BRICKMAKING.

No. 36.

BY "R. BRICK."

Many brickmakers who have one machine with a daily capacity of 25,000 brick and an engine of sufficient power to run it, when they wish to increase their output, buy an additional machine. This necessitates buying a larger engine and boiler, the number of employes are increased 100 per cent., more space for drying and burning is required and buildings enlarged, tools must be furnished for twice as many men as before, in fact everything must be duplicated. This is done in many cases where the first machine has never been run more than five or six months in a year. Now it would appear a plain business proposition, that the first machine ought to be run to its full capacity before incurring the expense of a second machine with all its attendant expense.

One machine making 25,000 bricks per day and running 24 days per month will make 600,000 bricks, and running ten months a year would make six millions of bricks. There are many brickmakers who do not make more than half this amount with two machines.

To make six millions of brick per year with one machine it is necessary to have artificial heat for drying, and this method I think cheaper than natural drying. The bricks occupy less space, and in this way saves moving brick long distances from machines to drying floors, and again from drying floors to kilns, also cost of haking, covering and uncovering is saved. Again, the loss which attends outdoor drying is avoided, certainty takes the place of uncertainty, so far as the quantity of bricks made and saved is concerned. These advantages and sav-

ings will more than pay for fuel required to dry them under cover, where they can be dried in rainy as well as clear weather and winter as well as summer. In order to make brick every day it is necessary to have a few days supply of clay under sheds, to draw from on wet days when men cannot well work outside.

One objection offered against making the whole year is, in fall and winter there is little demand for brick, and provision must be made for storing the product.

Bricks can be moved from the kiln to the stock pile at a cost of from 20 to 25 cents per thousand. By doing this the demand can be met in the busy season, even though it is double the capacity of the machine. When there is a large demand for bricks the prices invariably rule from 50 cents to \$1.00 per thousand higher than in the dull season. This more than repays the cost of storing the burned brick. The wise and successful brickmaker is the one that in dull times looks ahead and prepares to meet the future demand, and when it comes sends out his accumulated millions of bricks at a good price. While his short-sighted competitor says, "If I only had a lot of brick," and talks about bad luck and such nonsense. It is lack of nerve and foresight. I have seen this thing occur many times repeated and will see it often again. A brick manufacturer may not have orders for 100,000 bricks on the 1st of January, and a million on hand; by the first day of April following, that million has gone where all good bricks go—in the wall—and he will have orders on his books for two millions more. This is not a supposed case but an every year occurrence with hundreds of brick-makers. Pile your bricks up. Burn them well, so they will stand weather, and you have the best stock in the world. The moths will not tackle a hard brick more than once, and it will be the moth that is damaged and not the brick—and they are too cheap to steal; they are indestructible; they are fire-proof, frost-proof, and cyclones pass by them on the other side; they never get out of fashion, therefore, need not be sold at cost. Where, on this uncertain earth, is there anything so safe as money invested in a pile of well-burned bricks, that have been well made?

Now, it seems to me, it would be better—more satisfactory, because more profitable, to prepare to run your present machine steady, than to buy another and let them both rust out two-thirds of the

year, while the employes are thrown out of employment in winter just when work is scarce. Get a good set of men, give them steady employment through the year, and employer and employe will be richer at the end of the year. "Go to," build you a dryer and permanent kilns and sheds, make all the brick possible with the machinery you now have before going off and buying more machinery, and leaving that which you now have to stand idle the greater part of the year.

Written for the Clay-Worker.

POTTERY.

No. 4.

Perhaps of all very simple looking things the "perfect brick" is the most deceptive. One may say what one pleases about art in architectural terra cotta; it all would be as dead sea fruit were it not for the "perfect brick." We might as well look for the highest art of sculpture

The writer draws from his experience. He remembers a friend who had accumulated a competence and lost the whole of it because he tried to make a perfect brick out of clay surcharged with lime—hardly a decent brick in the kiln. His ambition was drawn from the success of another friend of the writer, who had made a fortune in making good bricks—but alas, they were yellow bricks—until that undesirable color had been entirely superseded in public taste. This second friend, however, spent a considerable part of the fortune in trying to freeze out a poor fellow (but who knew how to make brick) who searched until he found the clay he wanted, and behold a good and fashionable red brick. He did not freeze out any more than a Canada thistle. He grew wealthy and his competitor in good but yellow bricks, stumbled along until finally he doled out his yard into corner lots and so bade an

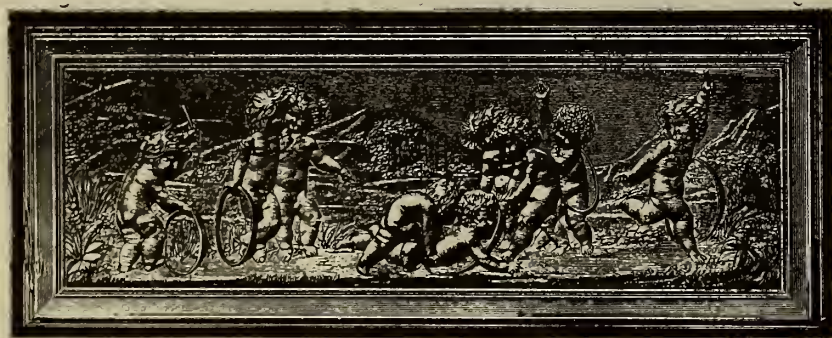
with chance and always make good brick if we will. To be sure, many poor brick are now made, partly because the brick maker does not consult the fund of information that his special papers bring before him, but often because his environment will not furnish him a good material.

The perfection of brick and terra cotta machines has enabled the modern brick maker to do what none who preceded him could do—make a perfect brick. The hand made brick was light and porous, compared with those forced out with the enormous pressure of the machine. This gives us a smooth, dense, lasting brick and by the addition of art gives us a terra cotta that is nearly as useful as marble for architecture; far cheaper, more mobile and in many cases even prettier. The writer, of course, takes it for granted that the clay and its treatment are of the best.

We have succeeded in making the perfect brick. We are applying our knowledge in producing an art that may utilize this to the highest. As was suggested in our paper last month, this art was so appreciated that scarcely a modern house of any pretensions, that does not utilize this last product of the brick makers' art. Indeed, it is rapidly trenching upon the domain of the highest art capable of expression. It is doing more than this, even; it is producing these expressions of art at such marvelous cheapness that the most fanatic and poverty stricken apostle of democracy will have some of it on his house or on its mantels.

The future of terra cotta is as boundless as the demands of architecture and art for house and household decoration will admit and with the genius of our people in home building and our appreciation of the beautiful; this means that the art is destined soon to become one of the leading industries of this country.

The efforts of all terra cotta workers should be towards the study of form and an acquaintanceship with the works of art of all countries and ages. The prevailing rage is for Mediaevalism and dragons, griffins and serpents grace the head pieces of lintels, fireplaces and pediments. As designs, they are expressive and often fitting, but they are being used too extensively and a monotony of design is already apparent that is needless when so many other forms of expression exist that are equally expressive and much more life like and beautiful. Perhaps this is due to the predominance of



without marble as a terra cotta art that was not born of a brick. Simple looking as it is, it took a thousand years to learn how to make one. Indeed, the perfect brick really was not born until a few years ago when it came as a sort of apotheosis of modern mechanical art and could not come before because the highest skill in mechanical art had to precede the "perfect brick." But this is not all; the science of chemistry had to be born, expand and finally reach its present perfection before a perfect brick could be made.

These remarks may have a strange sound to many who have not given the question much thought. Not only a perfect brick, but what we would call a fairly good brick, requires a thorough knowledge of the constitution of clay deposits, long and varied experience in attaining the best results from clay banks, which each vary so much that a treatment given to one that would produce a perfect brick were it applied to another, would produce the worst, most worthless brick.

agreeable and final adieu to the brick field.

The Egyptians made an almost worthless brick, that is if we were to subject it to our rigorous climate. Nothing ever integrates in that dry, hot climate. The Babylonians, indeed, burned some of their brick but they were by no means the brick that would compare with ours, despite the antiquity of association. The inhabitants of India made brick, but they were sun dried and would become excellent hot house soil about the third winter in our northern clime. The Romans, indeed, made good brick—good as any hand-made brick—but they did not make such because they knew how, but because Nature had provided them with a clay so perfectly adapted that nobody, by any means, could make a really poor brick out of it. This was merely chance. I have no doubt that if the noblest Roman brickmaker of them all if he were to be asked why he made good brick, could have told us the first useful point.

Modern science has enabled us to answer. It has also enabled us to do away

German thought and German people, in the terra cotta work of this country with its grand, somber, gloomy but chaste spirit. A little of southern liveliness and human spirit could be borrowed with great good to the popularity and taste of the art and would, by contrast, improve the confessedly powerful impressions from the Germans. The specimen represented in the cut is a case in point, a companion piece to one given in last month's paper. The worker in clay will conceive numberless situations, especially for interiors where those designs would apply with happy effects.

Written for the Clay Worker.

THE DRY PRESS PROCESS FOR THE MANUFACTURE OF COMMON BRICK.

BY W. D. RICHARDSON.

No innovation in the methods of brick manufacture has been so radical, and hence so decried and disparaged, as the making of brick out of dry clay. The history of this process is largely a record of failures, but repeated failures, in our own, as in all arts, have formed the groundwork of success. Even the men who derided these attempts and said, "I told you so"—"It can't be done," are to-day forced to admit that the brick turned out from these dry press brick works never have been equalled in all the requisites of a durable and ornamental building material. That the dry press process is the cheapest and best for the production of face brick, wherever the clay is suitable, needs no further proof than that afforded by a few minutes observation at any successful establishment. But the question which is now agitating the minds of many brickmakers is: "Is the dry press process practicable for common brick?" that is, "Can common brick be made cheap enough by this process to compete with those employing the other processes?" Here is a wide field for discussion, though the subject was so lightly passed over at the Memphis convention.

Let us first consider the affirmative side of this question and investigate the advantages of this process over all others:

1. *Cheapness of handling the green brick.* The brick having been placed upon trucks by the off-bearers are wheeled by the tossers direct from the machine to the kiln.

2. *No loss by exposure to weather.* This is a manifest advantage over the method of haking on ground or racking on pallets, not only on account of there being absolutely no loss, but because of

the relief from all anxiety on this score. The brickmaker employing this process can go to bed at night knowing that the day's output is ready for the burner.

3. *No expense of building and operating dry houses.* This advantage is nearly off-set by the expense of building clay sheds and of storing clay. Clay sheds, however, are cheaper in construction than dry houses and clay can be handled at less expense than brick.

4. *No loss of time by inclement weather.* The brick can be manufactured the entire year, if desired. All contracts can be fulfilled promptly and advantage taken of a high market. Moreover, laborers employed in all kinds of weather throughout the year can be secured at a lower price.

The above are some of the chief advantages of the dry process and need not be expanded further.

On the negative side of this question may be mentioned as disadvantages of the dry press process:

1. *Greater cost of plant.* The buildings, machinery and kilns suitable for the manufacture of dry press brick, are much more expensive than those needed for the manufacture of soft or stiff-clay brick. Moreover, considerable capital must always be tied up in the storage of large quantities of clay. Wherefore this process is beyond the reach of the majority of brickmakers.

2. *The process being more modern and scientific, there is greater difficulty in securing competent men for the responsible places.* No one should undertake this process without the services of a man that has had a successful experience with it. The neglect of this advice has caused many disastrous failures. As such men are scarce a larger salary must be paid than for similar services in the older processes.

3. *Brick made by the dry process require more fuel and a longer time for the burning, since they contain more clay.* Moreover, the burning of dry press brick properly requires special knowledge and experience, and competent men for this are in demand at prices a little in advance of others.

4. *Dry press brick are heavier and hence the cost of transportation is greater.* In some cases this may not be an appreciable disadvantage, but where competition is sharp, cannot be disregarded.

Now, having considered briefly, in a general way, both sides of this interesting question, what conclusion can be drawn? None that will be applicable to all cases. No process of making brick will ever be

universally adopted, for the reason that no process is best for all conditions. Least of all will the dry press process, for reasons already stated, come into general use. That it is becoming more extended each year is evident, and the day is near at hand when nine-tenths of all the fine face brick, plain and ornamental, will be made by this process. It is doubtful, however, if this process with the machinery now in use, can be made profitable for the manufacture of common brick, exclusively. I am aware of the claims of press manufacturers but I do not know of anyone that has succeeded in fulfilling these claims. But where the clay burns a good, salable color for face brick, both common and stock brick can be advantageously made at the same works, on the same machine if desired—the stock brick being set in the most favorable part of the kiln.

These remarks do not apply to the Hydraulic Press perfected by Mr. Graves, of St. Louis. This machine is unquestionably far in advance of all others, and, with suitable clay, will make profitably any grade of brick.

A few words, in conclusion, to those who contemplate embarking in the dry press brick business. Be sure that you have plenty of capital—ten to one-hundred thousand dollars will suffice to start with; have your clay thoroughly tested by disinterested parties; secure the services of a competent brickwork's engineer to build your buildings and kilns, select machinery adapted to the clay and start on the right track. Then, by perseverance and "eternal vigilance," success will be yours, and the satisfaction of contributing to the comfort and well-being of your own and future generations by providing them with a building material, cheap, handsome and durable.

CLAY BONNETS.

"Among the most curious people of this continent," said a traveler, "are the native Peons of Mexico, and when you look at the female portion of that unaccountable race you get a curious representation that makes you pause with wonder.

"Living on the borders of Arizona and Mexico, as I have for nine years past, I have had a good opportunity to see many things that most transient people would pass by unnoticed. The longer I stay the more I am impressed with the unaccountable ways of the descendants of the Aztecs. The society 'lady' of the Peons, if I may speak of her as such, has a way

of doing up her back hair that I have never seen duplicated anywhere.

"It is no less than to put a great clay crown on the top of her cranium, in which the hair is matted like pigs' bristles in plaster. This crown reaches up say eight or nine inches and looks like a great plaster cone. It serves a double purpose. Not only is it worn at evening parties, but throughout the day. Indeed, the primary object of the mud cone was to protect the head from the intense heat of the southern sun. Now, however, it is worn at evening balls, and no 'lady' thinks herself *recherche* and in positively good form unless she has her novel crown on. The hair is matted and twisted and coiled all around in it, and it may be depended on that it can not come loose and come tumbling down and cause her any embarrassment in company. The longer a cone is worn the harder it gets, and when it has reached the age of a month, say, it is as hard as a brickbat, and would have to be smashed to pieces with a sledge if there were no other way discovered. This, however, happily is the case.

"The old Aztecs invented, and the secret has been perpetuated in the race, a peculiar solution compounded from wild plants which knocks the plaster top-knot to smithereens. It takes some time to do it, however, usually from five to six hours, and during this time the lovely Aztec maiden or matron must soak her head in a big jar of this solution. It is the proper thing for the women to change these cones at least once a month. After that the whitish soil of which it is composed changes to a dull yellow and the wearer loses caste. And there is caste among the Peons as much as there is among any other class of people.

"These native women are fond of necklaces, and you will often see them going about with nothing on except a necklace and a mud crown. Others again will have slight raiment. The men do not wear mud crowns, but they are often as limited in their attire as the feminine sex. Their habits are extremely simple in the main, though in some other respects they go off on wild tangents."

* * * —*San Francisco Examiner*.

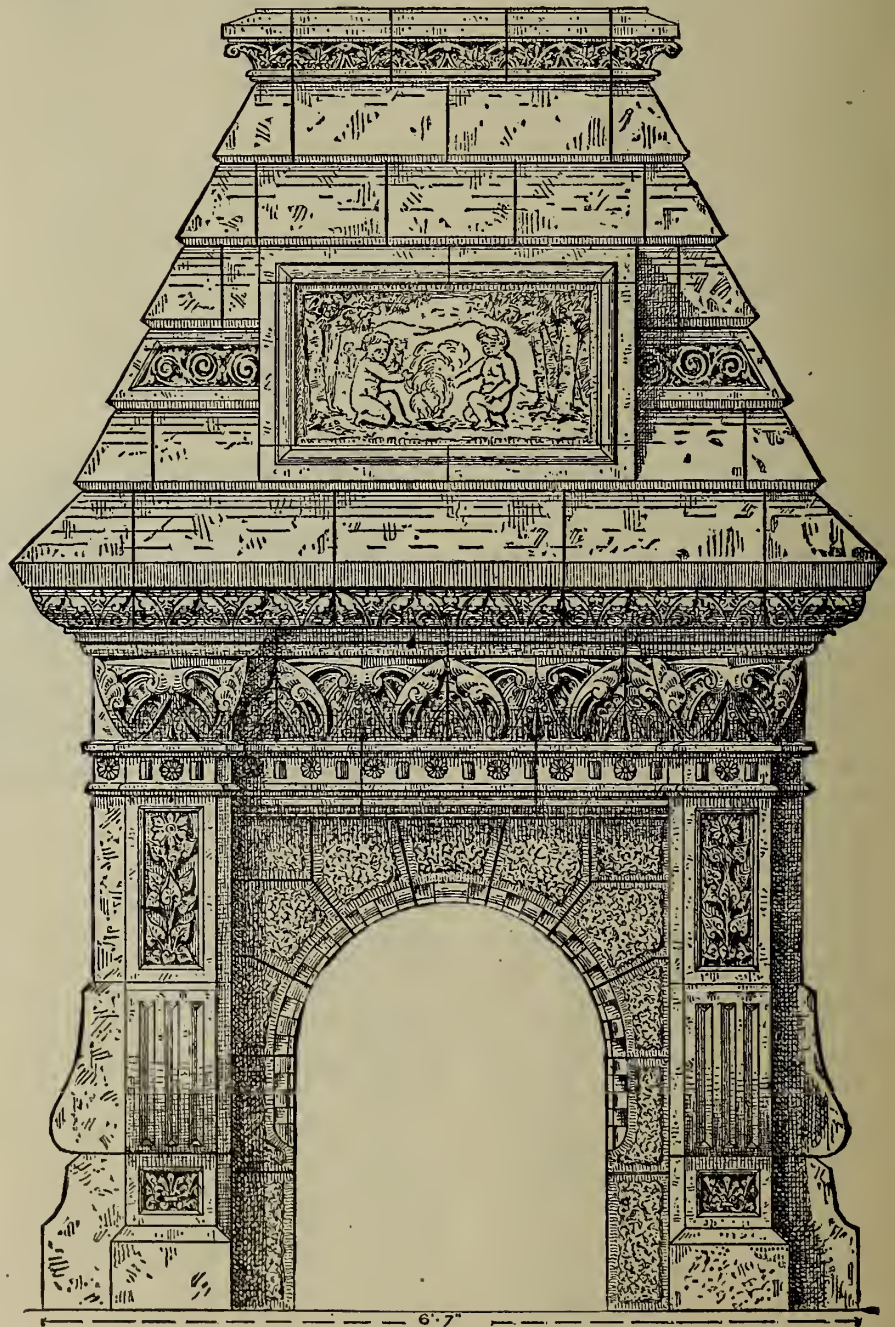
The durability of brick walls is very much effected by the character of the mortar used in laying the brick, and the condition of the brick when laid. Clean, sharp and rather coarse sand should be used for mortar, and the lime should be water-slaked and fresh.

DESIGN FOR A MANTEL

By The Indianapolis Terra Cotta Co.

Such designs are interesting to constructors and become generally so to the public as attention is directed more and more to ornamental forms and colors. The use of terra cotta and ornamental

herewith presented to our readers, is a pleasing design. It will serve, we trust, to increase the interest in the revival of this ancient art. There are few buildings even now, in the larger towns and cities, that are intended to be imposing in appearance that are not constructed so as to ornament them with terra cotta



TERRA COTTA MANTEL. *Designed by the Indianapolis Terra Cotta Co.*

brick will increase in proportion as the public taste is educated in this direction. There is indeed marked progress along this line already attained and in the future construction of buildings intended to be durable and pleasing to the eye, terra cotta will enter more largely into their construction both outside and inside. In the illustration

panels, and the more terra cotta the better. Well made terra cotta will resist the disintegrating influences of the weather, is more lasting than stone, granite or iron, either of which yield readily to the action of fire. In addition there is a richness in bright or deep red terra cotta that commends it to the eye, and the judgment, knowing as we do, that it will last through the centuries.

Written for the Clay-Worker.

MANUFACTURE OF SEWER PIPES AND DRAIN TILE.

BY CHAS. T. DAVIS.

The clay from which sewer pipes are made is a grade of fire clay. Much care is required to be exercised by those who select the clay from which sewer pipes are manufactured; the coarse, open, non-plastic clay used for fire bricks will not answer the required purpose. Earthenware pipes of this character require that the clay shall be plastic so as to form a close, homogeneous body similar to that used for architectural terra cotta. It is also desirable that the clay should contain a large proportion of silica, which is a material assistant in applying the salt glaze as will be hereafter explained. The clay should be dug in the autumn or winter, and exposed to the action of frost as by thus "weathering" the clay its particles are disintegrated, the water diffused through the substance expands by freezing, thus breaking the clay in every direction. The more extended the period of exposure, the more effectually is the clay reduced and easily tempered and formed into pipes. But in these times of rapid production, the digging of the clay in the autumn and "weathering" it are not usually attended to; but to neglect it, however, is to run the risk of having the drain pipes unsound as well as faulty in shape.

The clay before being used is placed in a pit usually at the rear of the pipe machine and is allowed to soak in water over night. But a large number of manufacturers of sewer pipe in order to save the expense of digging the clay in the autumn and placing it in and removing it from the "soak pit," employ rollers for grinding the clay, which, after being disintegrated, passes into the tempering cylinder. This method of disintegrating the clay for sewer pipes answers only imperfectly as a substitute for digging and weathering the clay. Limestones, as well as lime pebbles are often diffused in the clay from which sewer pipes are made and it is necessary that such extraneous matter should be removed as much as possible, for in the kiln the limestones and lime pebbles are converted into caustic lime and if the glaze has been imperfectly applied, or if from any other cause the moisture or carbonic acid which is always present in sewers and penetrates when once admitted, to every part of a pipe, slacks the nodules of lime, the swelling causing the pipe to burst and break to pieces. Costly drains

have often been destroyed in this way and it is therefore worth while for engineers and architects to inspect the sewer pipes that are being used in works over which they have supervision and to observe that all lengths of pipes and connections are properly glazed. Manufacturers and plumbers charge for perfect goods and there is not the slightest excuse for expecting them to accept inferior half-glazed or porous material. It is with clays containing diffused limestone and lime pebbles that disintegrating rollers are most useful.

Clay used for the manufacture of building brick will make good drain tile. Care should be observed however, not to have the clay too sandy as tile made from such clays would be too weak to stand long shipment. In mining the clay from the bank it should be thoroughly mixed from the top to the bottom of the clay bank and some clays when thus mined and mixed give good results when the clay is taken directly from the bank. Other clays require to be dug in the autumn or winter and exposed to the frost while others may be spaded up and exposed to the action of the air for a longer or shorter time with beneficial results. Clays of all characters used in the manufacture of drain tiles will be more or less improved by being run through a pulverizer. It is only through practical test that the best clay can be selected for the manufacture of drain tile, as it is impossible to foretell the various peculiarities which will be developed in drying and burning various clays. One rule, however, may be laid down—that is, that an open, coarse, gritty, sandy, non-plastic clay will not make good drain tile. The clay used for this purpose should be plastic, smooth to the touch and possessing such characteristics as would commend it for the manufacture of a good grade of building bricks. Any clay selected for the purpose should possess the quality of drying in the open air without damage, if possible, as the expense of drying by artificial means should be avoided.

In most of the machines now in use for moulding sewer pipes the tempering machinery is connected with, and forms part of moulding mechanism, but in other contrivances a quantity of tempered clay is placed in a cylinder which is refilled as the material becomes exhausted. As in brickmaking, so in sewer pipe and tile pipe making, there is a very large number of machines intended to economically shape all the different

styles of pipes as well as others to handle it as the pipe comes from the dies, and others still, to cut the clay tubes into rings, etc. The straight lengths of pipe are shaped by forcing the tempered clay through a die chamber at the end of the pipe machine which is fitted with exterior and interior dies, the difference in the diameter of which, regulates the thickness of the material constituting the pipe. Sometimes the lengths of pipe are made with a projecting flange or socket on the one end, and at other times the pipe is plain, the connection being made with rings which are made separate and are called collars. The latter method being the most common way of connecting all pipes exceeding twelve inches in diameter.

The lengths of pipe are received from the press upon tables and endless belts of various designs. Some of the tables have flexible straps which conform to the outer surface of the tile and prevent it from becoming flattened or otherwise disfigured in shape as would be the case were it carried by bars which did not conform to its surface while in a soft and plastic state in which it issues from the dies of the machine.

The larger sewer pipes are sometimes made so as to allow smaller sized pipes to enter them at an angle. S-traps, T-pieces, X and U-pieces, elbows, etc., are made for the different sizes of pipes; they are separately moulded and are somewhat more expensive in proportion than the lengths of pipe.

The curves, elbows and traps for sewer pipes are made by machines especially constructed for the purpose, which are so arranged that by moving a plate placed over the mouth of the die, the clay can be made to issue more rapidly from the opened side than the other. The curve is formed in the pipe toward the side on which the space is contracted. By sliding the plate on the other side, the pipe will curve in an opposite direction and by a succession of movements of the plate, any desired form of curve or trap can be formed.

The contrivances employed for forming sockets or curved earthenware pipes are also very ingenious and in order to explain the machine used for this purpose it is necessary to state that ordinarily to form such sockets or sections of straight pipe the outer die is prolonged beyond the point of discharge of such length and inside shape as to form the outside of the desired socket. When, however, the pipe curves as it issues from the orifice, this

device is impossible, as the issuing pipe encounters the edge of this socket-die and is destroyed. In order to obviate this difficulty the socket-die is constructed separately from the other parts of the machine in the form of a ring divided into two parts so as to permit of its being removed. By means of a lever this ring is firmly held in place until the socket is formed when by a combination of arms and links the ring is opened automatically and the socket having been formed, the curing is proceeded with.

After the pipes have been formed, the next step in their manufacture is, of course, that of drying, and this is proceeded with upon various systems. In the Western States where large quantities of sewer pipe and drain tile are manufactured, the factories for the production of this class of earthenware are of both timber and brick construction. When the latter material is employed, the walls are commonly built hollow in order to lessen the dampness. Architects are often called upon to make the drawings and specifications for tile factories, and as the drying is an important step in the manufacture of earthenware pipes it may not be objectionable to inject here a few remarks on this subject, especially since the writer has often been requested to point out the defects and suggest methods by which errors of this kind could be remedied. A common method is to construct the factory, say, 40x60 feet and make the stories seven feet high, the top story, of course, being increased by the pitch of the roof. The floors are well supported and covered with 2x2-in. strips laid one-half inch apart. On the roof there is usually a ventilator running the length of the factory. Wrought iron pipes usually one inch in diameter, are placed underneath the joists with headers at either end for heating. The pipes are commonly divided into four sections so that all or but one section can be used for heating at one time, the idea being to control the steam, turning it in any division of the factory that may be desired.

The great drawback to this method of drying is that the dampness driven off from the freshly moulded pipes stored in the lower stories, remains below and can not pass through the upper stories, thus retarding the drying of the stock in the lower stories. The best plan is to lay the flooring as has been described and if the factory is a frame structure, to hang the weather boarding near the bottom of the room on hinges and allow the pipes used

for heating to pass around the story, securing them to the upright studding. If the structure is of brick, coils could be placed across suitable openings.

Drain tile are usually dried in sheds more or less open in their construction, which have doors so arranged at the side of the shed as to allow the admission of air in the drying apartments in such quantity as may be needed and as the nature of the clay may require. At proper places in each ceiling there should be suitable openings having ventilators leading therefrom and passing through the roof, thus creating a constant draft and separately carrying off the dampness from each story. Experience has shown that the sides are the proper places to arrange the pipes for the steam and the current of air from the outside is usually sufficiently strong to force the heated or dry air to the center. The effect of side openings other than the kind mentioned, is to create counter currents thereby destroying the whole effect. Without such openings the air forms a current up the sides of the building and does not reach the center.

After the pipes have been thoroughly dried they are placed in the kilns, which are of various constructions, some being operated on the up-draft and others on the down-draft system. But the old form of circular oven, so much employed in Staffordshire, England, is found to answer the purpose, and perform the burning more thoroughly than most others in use.

In placing the pipes in the kiln much care is required to be exercised, for in the manufacture of sewer pipe it not unfrequently happens that much of the pipe comes out of the kiln in which it is burned in a greatly damaged condition, the pipes having gotten out of place during the burning, and become bent or adhering together in masses.

Sometimes in order to prevent this displacement of the pipes when in the kiln each pipe in the top tier is secured to its neighbors by means of binders made of clay, like that of which the pipes are made and baked or burned in the manner usual in this art. Binders are also used to connect the tier of pipes with the wall of the kiln, special bricks being built into the wall to engage one end of the binders.

It is customary to place elbows and other connecting pipes on top of the upper tier in filling the kiln, and these binders make a floor much better adapted for receiving these elbows and con-

nections than the upper ends of the upper tiers of pipes. The practical use of this method of binding the pipes together has demonstrated that the waste from this source, which has heretofore been one of the most serious losses in this manufacture, is entirely obviated. So far as the writer knows the binders which have been described are the only practical remedy for this evil.

The pipes shrink in burning, so that the binders should, of course, fit loosely over the sockets when the kiln is set.

The kiln having been filled, the doorway is walled up with bricks and carefully daubed over with loam and sand, the fires are lighted and kept slowly burning for the first six or eight hours, after which time they are progressively increased for the next forty hours, making the total time about forty-eight hours for hard fired sewer pipes. If the stock has not been thoroughly dried before it is placed in the kiln, the time required to burn the pipes is, of course, longer. Kilns of this kind are commonly fired only a week, but they can be fired twice in three weeks if desired.

The burner determines the heat by directing his sight to the mouths and top outlet of the oven; when the heat is reached and before the fires burn hollow, the mouths are stopped up with ashes to prevent the cold air from cooling the oven too rapidly.

The salt glaze is the one commonly employed for earthenware drain pipes.

The process of glazing with salt is of ancient origin and it consists in throwing the salt into the kiln towards the end of the firing, and just before the highest heat is obtained.

Salt that has been used for preserving can be employed as it is not requisite that it should be pure.

The fires should be properly managed, and at the right temperature in a closed kiln or oven, the salt is thrown uniformly through the holes at the top of the kiln. Small, light scoop shovels are best for this purpose. The quantity of salt necessary for a moderate sized oven is 150 to 160 pounds. About one-half the quantity of salt having been thrown into the oven, the fire is momentarily increased, then reduced, and a few specimens of clay burned with the pipes for the purpose, examined. The remainder of the salt is thrown in, part at the top, and part regularly over the top of the fire.

The temperature of the kiln is so high at the "burning off," or end of the firing,

that the volatile salt is at once converted into vapor, which intimately surrounds the pipes in the kiln and there is consequently a reaction of the vapor on the silica of the clay bodies.

The agent which promotes the reaction of the silica and common salt is the aqueous vapor which is always present in the flames of the furnace. The oxygen of the water produces soda with the sodium of the common salt, while the hydrogen combines with the chlorine, and is evolved as hydrochloric acid, the soda then enters into combination with the silica.

The glaze produced upon the earthenware pipes in the manner described is consequently a soda glass, and forms a very thin film or coating upon the material. It is of course manifest that the greater the quantity of silica a clay contains the more readily it will decompose salt, and the more lustrous will be the glaze produced. When it is desired to secure the brown color so common on drain pipes, it is communicated to the glaze by throwing such substances as birch bark into the fire during the glazing process, and the larger volume of smoke thus evolved produces the desired effect. It sometimes happens that the ware in some portions of the kiln becomes covered with salt, a part of which then appears as efflorescence.

After the kiln has been properly fired all the doors and openings are carefully daubed around with a mixture of sand and clay, a few air holes in the furnace doors not exposed to the wind being allowed to go unplugged for a few hours, and after two or three days the burned and vitrified sewer pipe is ready to be removed and shipped to market.

In the burning of drain tile as in the burning of sewer pipe it is essential that the tile should be thoroughly dry; the dryer the tile the better the success to be attained. The time, fuel and other items of cost, which have to be expended for the thorough drying of the tile in the kiln might just as well be saved if possible by utilizing the natural method of drying. The manner of setting the tile in the kiln is also an important item and the method employed varies with the various kilns in use. When the Dutch or open-topped kiln is employed, it is usual to set the small tile in the bottom of the kiln, the larger tile is then placed in the central tier, the smallest tile being placed in the upper portion of the kiln and in no case should the tile be allowed to come in contact with the walls, a space

of about one inch and a half should be left open all around the side of the kiln. When the up-draft or crown-top kilns are employed for burning drain tiles the method of setting is similar to that which has just been described, although it is found from experience that better results are obtained if the tile of largest diameter are set near the top. When the down-draft kiln is used for burning the drain tile it is desirable that the large tile should be set at the top, care being observed, however, not to place the large tile at the points of extreme heat. And in kilns of this character it is desirable that if there are any tiles which are not thoroughly dry that they should be set at the bottom of the kiln so as to obviate the necessity of driving the watersmoke from the damp tile through those which are dry.

The method of nesting the tile varies with different clays, some clays will allow close nesting, while other clays require to be nested very openly. No rule for nesting the tile can be laid down, the best method to be employed can be developed only from thorough knowledge of the practical qualities of the clay to be burned. In order to avoid the cracking and loss from improper nesting it is desirable, where defects of this character occur, that the cause should be thoroughly investigated and a memorandum made of the result upon the books at the works. If some such simple system as this could be adopted in the various clay works of the country and the result of the practical experiences could be brought out at the conventions, or recorded in the pages of the Clay-Worker, great good would result to the trade in many of its branches.

In firing the tile care should be observed not to push the burning too rapidly, only a light fire should at first be used in the fire-box; then the heat should be raised very gradually, fuel being added in smallest quantities as nothing is to be gained from pushing the burning of the tile in its early stages. The watersmoke must be driven off gradually but surely, until at last none of it can be discerned mixed with the blue-black smoke which issues from the top of the flues or stack. Patience worketh wonders in burning drain tile as in burning all other classes of clay products. Of course the dryer the tile the quicker the kiln may be burned off; but as it is not possible to have all of the tile of a uniform degree of dryness all the dry tile have to be held back until the moisture

has been thoroughly driven from the damp tiles, otherwise crushing, cracking and other losses will result. Even after the watersmoke has been thoroughly driven off it is desirable not to push the burning too rapidly, increase the heat until the tile have been brought to nearly the melting point, and at this temperature the heat should be maintained for two or three hours; great caution, however, should be observed not to increase the heat to the actual fluxing point, for in such a case the tile would run together and the kiln prove a loss. With some clays, however, it will be necessary to maintain the final heat all the way from four to eight hours. After the kiln is burned off it should remain closed for about twenty to twenty-four hours, after which time it may be gradually opened and allowed to cool.

THE MEASUREMENT OF BRICKWORK

It is curious to observe how considerably the method of measuring brickwork varies in different parts of the country. In many localities, Philadelphia for example, the custom is to measure it by the number of bricks contained, but this system possesses a serious disadvantage. There is no uniformity in the size of bricks, and hence the size of a wall, which a given number of bricks will produce, is uncertain. When, therefore, the price per thousand for laying bricks is given, considerable trouble is involved in arriving at the cost for the whole of the brickwork in the building.

Probably the better plan is to measure by the dimensions as is common in several sections of the country.

The unit of measurement in this case is not important. The cubic foot or yard is employed to some extent, but the perch of 25 cubic feet and the superficial rod in brickwork one brick thick, are often used. Unfortunately the term "rod" has no very definite significance. Two hundred and seventy-two and a half feet super, and one and a half bricks thick, $16\frac{1}{2}$ feet square or $272\frac{1}{2}$ square feet and one brick thick, $16\frac{1}{2}$ square feet and 63 square feet, are all termed "rods." Under these circumstances it would probably be, of advantage if the cubic foot or yard could be made the standard unit of measurement for brickwork throughout the country.

It may be added that the number of bricks contained in any piece of built brickwork may be approximately ascertained by deducting one-tenth for the volume of mortar.—A. S. J.

Written for the Clay-Worker.

THE OLD CLAY PIPE.

BY MARGARET ANDREWS OLDHAM.

You may talk about your meerschams,
your cigarettes and such,
And the new fangled smoking things
that be;
You may rave about your "antiques," with
jewelled treasures set,
But a clay pipe is good enough for me.

I have travelled o'er the wide world, and
smoked the spicy weed;
(But I left far behind my old clay stem);
I have smoked in all the fashions that
every nation set,
But I found little joy in all of them.

While the smoke would puff as freely, and
maybe with more style,
I would think that it wasn't just the
same,
So I'd shut my eyes and fancy that 'twas
just a whim of mine,
And the difference was only in a name.

But the smoke and smell were different,
as chalk and cheese, I'm sure,
For it clouded my brain and filled my
eyes,
And it caused a sad home-sickness that I
never felt before,
As I longed for the old clay pipe I prize.

So at length in desperation, I hastened to
my home,
And my seat by the glowing hickory fire,
In the cosy chimney corner, the calmest
spot on earth,
Where such calm is the heart's complete
desire.

And I seized with grateful longing, my
slighted old clay pipe,
Which I filled with the aromatic weed,
Oh 'twas then I fully prized it, with its
sweet and cleanly smell,
And it seemed just to fill my every need.

As the puffs of blue smoke gathered in
clouds about my face,
As they formed into pictures pure and
fair,
Then my brain and eyes grew clearer, my
heart was light and free,
For the old pipe bewitched the very air.

So I filled it as for hunger and filled it yet
again,
And as sweet childish faces, rosy-ripe,
With their lips and bright eyes smiling,
peered at me through the smoke,
I would say, "Bless the homely old clay
pipe."

You may prize your costly meerscham,
with antique jewels set,
And the rarest you may find on land
or sea,
But I'd give them all most gladly for one
familiar puff
At the clay pipe, that's good enough
for me.

CORRESPONDENCE.

THESE COLUMNS ARE OPEN TO ALL. THE FULL NAME AND ADDRESS IS REQUIRED BUT WILL NOT BE PUBLISHED EXCEPT WHEN PERMISSION IS GIVEN BY CORRESPONDENT. THOSE DESIRING TO COMMUNICATE PRIVATELY WITH ANY CORRESPONDENT WHOSE FULL NAME IS NOT GIVEN CAN DO SO BY ADDRESSING LETTERS CARE OF CLAY-WORKER.

Paving Brick.

Editor Clay-Worker:

No doubt the manufacture of street paving brick is now receiving and has for the past two or three years received more attention than any other product made of clays. Yet the subject is in its infancy. It has, however, been sufficiently demonstrated to prove that brick make a splendid material for street pavements.

I thought that perhaps as good a thing as I could do would be to mention some of the leading places where street paving brick are made, that those who desire to investigate the subject further may do so or at least obtain some information of value; at the same time I shall take the liberty to make a few suggestions. You will find on the yard of T. B. Townsend & Co., Zanesville, Ohio, paving brick being made by the soft mud system, out of a semi-plastic fire clay. These brick are giving excellent satisfaction. Also at Middleport, Ohio, you will find them made from a good common red clay on a stiff mud machine. Both of these brick are being laid in the streets of Columbus, Ohio, the former also at Zanesville, and are giving excellent satisfaction. I heard some of the citizens of Columbus say that they preferred them to granite blocks.

Going toward the extreme Northwest, you will find at the works of C. J. Holman & Bros., Sargent Bluffs, Iowa, paving brick made from a very tough clay, as found in the bank, but when exposed to the atmosphere becomes very hard and difficult to reduce. This clay, in the bank, lays in layers of blue, gray, red and white stratas, with intermixtures of fire clay. Mr. Holman is now making a very good paving brick. When you go to see him, stay for supper and you will not regret your visit although you should fail, entirely, to see his brick plant.

Coming down to Lincoln, Neb., you will see the largest paving brick plant in the country. Stout & Buckstaff are making about 100,000 No. 1 paving brick per day, and have one of the most completely equipped plants I have ever seen. Their clay is a mixture of fire clay with very tough plastic blue and red clay. The strangest thing about this mixture is that nature has done its work. The

paving brick clay lays about 12 feet below the top soil. It comes out of the bank in a moist condition and will not take water until exposed to the atmosphere for some time. It stands a very high temperature in burning (all clays should, to make a good paving brick). Messrs. Stout & Buckstaff have a contract for laying about 20,000,000 of paving brick in the streets of Lincoln this season. It will pay any one thinking of going into the paving brick business to go and examine this plant.

Mr. John Fitzgerald of the same place has a very fine clay and is making an excellent paving brick. Coming down to Atchison, Kansas, you will find Benning & Beattie making and laying paving brick in the streets of Atchison; they are also shipping large quantities to Omaha. The average Omaha man is slow to admit that this city is surpassed by any other in any of the things pertaining to the comforts of the human kind; but as to paving brick clay, they willingly submit to Atchison (and a little investigation would demonstrate many other cities her superior in this regard).

Down the river at Leavenworth, the Government is putting in a very good plant at the Soldiers' Home. I am informed that they have the latest improvements and that their clay is good. Crossing the river from Atchison you will find at St. Joseph, Mo., on the yard of Bernard, Patton & Co., a very fine plant being erected. They expect to have out their first kiln about the middle of June. Their clay is similar to that at Atchison and Leavenworth. You will find at St. Joseph a number of very enterprising gentlemen, with a complete equipment of the most modern improvements for making paving brick. From here take the Wabash road to Moberly, Mo., where you will find one of the best clays I have ever seen. If you meet with the courtesies I did, and no doubt you will, Mr. W. G. Little, the secretary, will take you in his carriage to the works, where you will meet Mr. James Sandison, the manager. Their clay is blasted out of the mines and when first exposed to the atmosphere presents a dark steel color and is almost as hard as stone (soft stone). Every layer that is exposed brings to view the imprints of numerous kinds of vegetation belonging, perhaps, to the "sub-carboniferous period."

This clay, unlike any other of the same character I know of, dries in the sun under a strong wind without the least signs of cracking.

I do not think a superior clay to this can be found anywhere. Of course the mining and preparation for the machine is very expensive but the toughness of the clay in drying and burning more than compensates for this. I will say, that here you will see a very complete plant. While at Kansas City call and see the Diamond Press Brick Co. They have an excellent clay for anything they desire to make from clays. They have samples of terra cotta that are fine. The clay in the bank is similar to many others, I have mentioned, but much purer than some of them. Most of these paving brick clays are short but the Diamond Brick & Terra Cotta Co. have a clay that is very long and tough, burns a very fine color. So far this is the only clay that has been found at or near Kansas City that is suitable for good paving brick. There are a number of other places where paving brick are being made but I am getting this letter too long.

Allow me to correct what I consider to be a wrong impression, that is, this: Many brickmakers think paving brick can only be made out of what is known as "shale." This, I think, is a mistake.

I know a number of plants that are making excellent brick for street paving out of common plastic clays. One thing, however, is required, the clay must stand a very strong fire in, burning, without melting or twisting out of shape. For this reason many paving brick makers mix fire clay with common clay. Out of this custom or method the idea has grown, that to make a good paving brick you must have fire clay. I think the best paving brick that are now being made have no fire clay in them whatever. One word as to the preparation of clay for paving brick: Too many brickmakers have attempted to produce good brick without the proper grinding of clay. I find the better the clay is prepared the better the brick. You cannot get the clay too fine. The only thing I have seen, so far, suitable for what is known as the shale or soapstone or clays of that nature, is the dry pan. But for all plastic clays (purely plastic) I would use some kind of a roller crusher. I would like to say here something of brickyard construction, but time forbids.

"OBSERVER."

Questions About Drying.

Editor Clay-Worker:

Mr. Jno. W. Crary says in your May No.—"If clay will not stand sun drying it will not, as a rule, stand sufficient heat

in burning to make a good brick." I would like to ask him through your columns if he means to say that a clay which will not stand sun drying, also will not stand drying without check cracking in some form of steam or direct heat dryer? And he does not treat of the results obtained from some of these dryers, which I know to be in successful operation.

I should like to hear from some of the owners and builders of patent dryers.

I have here a clay which cracks very much in our hot Montana sun and strong winds, but which I have proved by drying in a close room without *any* direct heat, comes out with no check cracks, and burns into a strong but light colored brick, while the same brick sun-dried or set directly in the kiln, comes out "shaky" unless indeed it be burned until vitrified. Advice on this subject, direct to me or through your columns, will be thankfully received.

F. L. S.

Helena, Mont.

Wood as Fuel in Brick Burning.

Editor Clay-Worker:

The time is not very remote, when there was but one kind of fuel used in burning brick. Forty years ago, I believe I am safe in saying, there was scarcely any brick burned except with wood. And those in the old style out of door kilns. While to-day we use wood, coal, coke, natural gas, or oil, in permanent kiln walls, or improved-patent kilns, constructed on scientific principles.

Wood and coal, being more generally distributed over the brick manufacturing districts, are more largely used, and in all probability will be for years to come. When this country was in its infancy it was covered in a great part with a dense growth of forest, which usually occupied the best of our arable lands. Wood was then plenty, and every means was employed to rid the ground of this surplus timber; and among other things was the utilizing it so far as possible in brick burning. And even to-day in some sections where there are tracts of timber a little remote from a market, you may hear men speculating, and asking advice in regard to the matter, as to the advisability of using this wood to burn a kiln or two of brick.

They say I can't sell the wood and I have great lots of it going to waste; and I believe if I would use it up and burn a few hundred thousand bricks, I could sell them sometime even out here in the country.

And in many places where wood was less salable than brick it was the starting point of some of our prominent brick manufacturers, making available and profitable to themselves, their otherwise useless materials.

Wood, in most places, is being rapidly superseded by coal, wholly, or in part, and for several reasons—first, on account of its scarcity, which in turn makes it high in price.

Wood that has hitherto made the best fuel is no longer used as such because of its value in manufacture in various ways; where the trees were formerly cut entirely up into cord wood, of late years, the trunks and solid parts, are used as sawmill material, and the tops, limbs and inferior parts, together with dead or hollow trees, are cut into cord wood, so that no great quantity of first-class cord wood is available now, as formerly.

The comparative value of wood in comparison with coal, depends measurably upon the kind of wood, or the time it was cut, condition and quality generally.

The following table gives the value of wood as fuel compared with coal in weight:

One cord hickory or hard maple weighs 4,500 lbs. which is equal to 2,000 lbs. coal.

One cord white oak weighs 3,850 lbs. which is equal to 1,750 lbs. coal.

One cord beech, red oak and black oak weighs 3,250 lbs, which is equal to 1,450 lbs. coal.

One cord poplar, chestnut and elm weighs 2,350 lbs. which is equal to 1,050 lbs. coal.

One cord pine weighs 2,000 lbs. which is equal to 925 lbs. coal.

So it is safe to assume that 2½ lbs. of wood equals one pound of the average quality of bituminous coal; and a pound of pine wood is worth about the same as 1 lb. of hickory, assuming both to be dry—and in brick burning it is very important that the wood be dry, as each 10 per cent. of moisture will detract that much from its fuel value.

Wood should be cut and seasoned not less than six months before using; and should be split into sections so as to be handled readily, and enter the arches without unnecessary effort or struggles of the fireman.

Where the wood is split or left in large ungainly knots, or forks of trees, firemen will usually work around them or away from them; leaving them on hand and in the way when done burning the kiln,

and in this way a large lot of worthless wood is liable to accumulate.

Sometimes wood that is cut and "ricked" up in the woods, remains there for a term of seasons and deteriorates very much in value as a fuel. It may be the trees were of a variety that have no lasting-quality and the sap portion of the timber is soft and spongy, and rots easily. Such wood makes but little heat, by producing but little flame, and is no more than a smoldering bed of coals. The same would be true of other varieties of timber cut at the wrong season of the year, as then the worms would have so eaten and penetrated all the sap portion beneath the bark as to render it worthless. If the fuel is good the intelligent burner knows it; if it is not he must work accordingly. Any of the free burning woods—sound, hard and dry, is what is needed for fuel when you use wood. But do not expect your burner to do good work with green wood, or that which is sap rotten, or sour, heavy stuff that will not burn free in any condition, or a lot of small twigs and brushy stuff that may have been imposed upon you as cord-wood. As a rule, brick can be burned at the rate of two thousand to the cord of wood, and the man who makes from one to four million bricks annually, has a very grave problem before him in the early spring months. He must have his fuel on the yard at all times, when he does not need it as well as when he does, and many times during the season will find him short of fuel and a kiln hot. Some of the old brick-makers will smile and say: "I have been right there myself."

And again, wood is a bulky fuel, it occupies too much space that in most yards is valuable, and on account of its bulk and inflammable character must be kept at a reasonable distance from burning kilns. This necessitates much re-handling, which is expensive.

Now consider the bulk of wood necessary to burn four millions of brick at the above estimate: It would require a "rick" of wood four feet wide, eight feet high, and a mile and a half in length. This is only a reasonable, approximate estimate—some will say too much and others not enough—and is based on experience and observation among the brickmakers over a wide extent of country. I hear it frequently stated that there is a great difference in the burning or refractory properties of clay. But I find a greater difference in the fuel value of wood from one pile to another than I

do in the clay banks from one yard to another.

The woods of the Northern states are harder, tougher, and of more lasting quality, and make better fuel, as a rule, than the timber of the South, excepting only the rich, fat pine of the Southern states. Taking varieties as they run, white oak, beech, maple, hickory, post oak, ash, etc., and the growth is a hard, tough timber, making a lasting fire, while the native woods of the South, many of them are among the soft woods or lighter timber, such as soft maple, cottonwood, magnolia, cypress, cedar, chestnut, elm, sweet gum, etc., among the varieties of oak and hickory the timber is not so dense or lasting in its quality as a fuel. Over a great portion of the Southern states there is an abundance of good pine, but like all other sections where brick are most in demand the timber is getting scarce, and first-class pine cord-wood is scarce—and pine wood can only be had from the second growth timber, designated "old field pine."

BRIX.

City of New Castle, Pa., and Other Things.

Editor Clay-Worker:

The City of New Castle is beautifully situated between or among hills in the Shenango Valley at the mouth of the Shenango and Melanock Creeks, in the county of Lawrence. We have six blast furnaces, one rolling mill, the largest wire nail mill in western Pa., a large sheet mill and a wire rod mill being constructed and a new steel plant about to go up. In fact, we have a great many advantages here that other towns of this size have not got. Population, fifteen to twenty thousand. Lawrence Co. has long since been noted for its minerals.

The face of my clay bank is 25 feet. I run my cars into the bank, load the clay into the cars, haul them out without locomotion. The striping I use for red brick. I make paving, red, fire and shape brick, besides furnishing a large trade raw and ground fire clay. Capacity, 20,000 per day of 10 hours. I have lately put in a Centennial Machine which gives entire satisfaction. I sell my fire brick to all the farmers and mills around and they say that they can't be beat. I believe that I have the best common clay that I ever saw and I have seen a good deal of it. Since the best way to test the pudding is to eat it, my clay has been tested. I am furnishing clay to-day to parties who have been getting from me

for 20 years back—so much for quality. Out of curiosity, I had some of my paving brick tested for strength. I took four brick and they went away above other brick that were tested by the same parties. I won't give figures here. In Frey, Sheekler & Hoover's catalogue they quote from a party on the Ohio River stating that he can make brick at \$2.55 on cars. Now I think any man or men that put such figures to the public can't figure or are not long destined to run before they are in the hands of the sheriff for I can do 2,000 brick as cheap as the next one and it costs me every cent of \$5.09, and the way I am situated I can do it much cheaper than a great many. What do others think in regard to cost?

I turn out some very fine brick. Hoping to write you soon again, I am,

Yours, M. S. MARQUIS.

Drying With Crude Oil.

Editor Clay-Worker:

I should have been glad of an opportunity to revise the paper published in your May number. It was written 16 months ago and in this age of improvement and development that length of time may cause one to change his mind. For instance in regard to dryers, I said in January, 1888: "I am a decided advocate of artificial circulation to bring artificial drying to a point anywhere near perfection." I now say that from my experience during the past six months, I am satisfied that as good results can be obtained with a natural circulation as with fans. I have one dryer in which I use crude oil as fuel. This Dryer is constructed almost exactly as the first one I ever saw, which was invented by J. K. Caldwell, then of Philadelphia, now of Minneapolis. It has a flue or chamber beneath the ears the whole length of a 90 foot tunnel, with a cross flue at the rear end connecting with a stack, and uses radiated heat only. The great objection to this dryer, with coal as a fuel, was that the flue, or chamber, would clog up with soot or ashes. With oil this is entirely obviated. I have always lamented the supposed necessity for carrying the steam or evaporation from the front to the rear of a tunnel dryer and in the one now being described, the evaporation is taken off by a six-inch sewer pipe over each ear running through the roof of the dryer. To those who have never tried this plan I think the results will be astonishing. I am aware that most clays need to be dried much slower than ours and to those preparing

to dry artificially, I say, as indeed I do to all preparing to experiment at all in brickmaking, burning or drying—"Go slow." I am still enthusiastic in commending oil as a fuel and am now changing my boilers to adapt them to oil. I wish, however, to correct my figures a little, after using oil a year and a half. The saving is less than 20 per cent. over wood and coal but with better results and less waste. In my description of my dumping track I should have given the credit for this valuable improvement to B. W. Blair, of New Richmond, O., who not only suggested it but sent me a model which was faithfully copied. It is a great saving of cars and we really empty the car quicker than by the old way. The fad of our Chicago brickmakers at present is, pulverizing the clay in the clay hole. Several different plans are being tried and the results will be given in detail at the annual convention in Philadelphia. D. V. P.

Chicago, Ill.

Shrinkage and Expansion of Clay Under Heat.

Editor Clay-Worker:

I desired to correct one of your able contributors, who says that all "clay will shrink in burning, and that the common brick burner knows that his kiln must settle, but he don't know why." I would like for the learned professor to come "South" and see me. I can show him and tell him of many of our "clay fields," containing clay that will not change size or shape by any kink of furnace heat. Indeed some of our clays produce a brick that swells a little when burned very hard. Furthermore, I can tell the gentleman, that there are clays at the North, that will not shrink or fuse in burning, and if he will attentively read my article, I will show him more than his scientific researches have taught him, about clay and brick. I am old, but in no sense a 'Fogie,' I have always aimed to be in advance of my "craft" and don't look back, if I can see my way clear ahead.

I have never burned brick with gas—in the form now used in your state, but I have experimented with coal oil and clay long before gas was thought of for burning brick, and I hope soon to offer the trade an excellent invention for using coal oil or petroleum in burning brick. I have also a very simple and cheap kind of a kiln for the continuous burning of brick, and the utilizing of the exhaust heat of a kiln, just after it has been closed.

I tried one kiln in common clay for red brick and it was successful.

As soon as I can secure letters patent on my inventions I hope to present to the craft, through the Clay-Worker, full description of my kilns. They are so simple I think they will commend themselves to all practical brickmakers.

J. W. CRARY.

PRESSED BRICK MAKING

Near Petersburg, England.

Editor Clay-Worker:

Thinking that your reader might be interested in hearing something more, as to the work of pressed brick making in England, I send you the following extract from an article written by myself, which appeared in the *London Building News* of recent date:

COST IN DETAIL OF MAKING PRESSED BRICK.

PIECEWORK.	Per 1,000 Bricks.		Cost per 1,000 Bricks.	
	£	s. d.	£	s. d.
One man oiling the machinery and cleaning up generally.....	0	0	3½	
Three men getting and loading "knot" clay into wagons.....	0	0	10½	
Two youths shunting wagons ready to be hauled up by en- gine.....	0	0	6	
One man attending perforated bottom grinding pan.....	0	0	3½	
One youth feeding hoppers above machines with ground knots.....	0	0	1¾	
Two youths lifting bricks from machines to presses.....	0	0	3	
Two boys lifting bricks from presses to barrows.....	0	0	2¼	
Three men wheeling bricks from presses and setting in kiln.....	0	0	11	
Three men drawing kiln and loading bricks into wagons or carts, or stacking on ground.....	0	0	9	
Allowance to engine-driver ex- tra to wages.....	0	0	0½	
			4	3
DAY-work.		Per week.		
Two men—Hoffmann kiln burn- ers—at 30s. per week each.....	3	0	0	
One youth wheeling smudge, coals, and sundry work.....	0	12	6	
One man—engine-driver.....	1	6	0	
One youth—fireman and sun- dries.....	0	12	6	
One man—dry material man and sundries.....	0	15	0	
	6	6	0	
			1	7
			5	10

Each set of semi-dry machinery averages 80,000 bricks per week. Thus, £6 6s. equals 1s. 7 d. per 1,000.

Coals for engine fuel—the engine drives plastic machinery as well as semi-dry, so it is but fair to charge a proportion.....		Per 1,000	
Oil, Etc., for engine.....	0	0	7½
Brick oil.....	0	0	1
Coals and smudge for burning bricks in the Hoffmann.....	0	0	0½
	0	1	0
			1
			9
			7
			7

The above price is only the prime cost, and does not include wear and tear, rents, rates, taxes, interest on capital, etc., etc.

£1 equals \$4.84. 1s. equals 24c. 1d. equals 2c. Note.—40 bricks per thousand allowed for waste —i. e., every 1,040 bricks counts as 1,000.

These pressed bricks are made from shale, which in this district is known as "knots," and it is found immediately below a bed of plastic clay. This shale requires no previous preparation, it is in its natural state in the clay pit, got, loaded into wagons, hauled up by the engine, tipped into the perforated-bottom grind-

ing pan, ground, raised by an elevator, fed into the hoppers of the machines, made into bricks, pressed, loaded on barrows, wheeled to, and set in the kiln ready for steaming and burning in less than ten minutes—no sand, or any other mixture, is required; all that is wanted is, in very wet weather, a little dry knot clay itself thrown in the pan when it clogs. Winter does not stop the manufacture; unless the weather is exceptionally bad, the bricks can be made every working day in the year. The last two bad brickmaking seasons suited us admirably—the worse the weather the better for us, because we can go on, and it stops the hand and plastic yards, and we get a better price in consequence; for instance, one large Kent, Essex, and Middlesex firm of brickmakers made 15 millions below their average last season, and the pressed yards never did better. All our stock of bricks has gone, and we are now sending away something like one hundred thousand bricks per day.

Another great advantage is, being able to make special sized or special shaped bricks in half the time other yards can; for instance, within an hour after receipt of an order, a portion of the bricks can be in the kiln, and in fourteen days loaded into trucks and on their journey to the customer.

The bricks sell freely in the London market, they are of good shape, and require little trouble to lay.

Orders are coming in freely, and the makers have orders for some considerable time ahead.

The great secret of all this is, our "knots" is a material that will stand grinding, quick drying, contains a great portion of natural fuel, and takes but little coal to burn.

A strike or ring in the coal trade would be a fortune to us, because we can burn our bricks for so very little money; it would pay us to go on making when the increased price of coal must close other yards.

The knot clay also, when ground, makes drain pipes and roofing tiles.

The bricks made are of three sizes—9 in. by 4½ in. by 2½ in.; 9 in. by 4½ in. by 2¾ in.; and 9 in. by 4½ in. by 3 in. Latterly bricks 3¼ in. thick have been manufactured, and it is probable that bricks even 3½ in. thick will be commonly made.

There is no loss from exposure to the weather, the bricks being stacked direct from the machinery in the kilns.

FURTHER DETAILS OF THE BUSINESS.

As to machinery used:—

The knot clay is got and loaded into small tram wagons containing three-quarters of a yard each, hauled up by a chain by the engine, and tipped into a 9 foot perforated bottom pan—i. e., the pan itself is 9 feet in diameter, not the outer frame. Each complete pan has a top pan and a bottom one called a saucer—the top pan revolves and has a perforated bottom, the bottom saucer is fixed and has a solid bottom—the rollers are fixed, revolve on their own axles caused by the friction of the revolving perforated bottom pan—fixed scrapers are in the top pan to guide the clay under the rollers—after the ground clay drops through the perforated pan it is pushed by lower scrapers into a boot formed in the saucer and is lifted from this boot by bucket elevators (on a leather revolving belt) to a stage above the machine hoppers—a boy feeds these hoppers and the bricks are shaped in the cylinder of the machine, delivered on a board ready for putting into the press. A 9 foot pan, 1 elevator, 2 machines and 2 presses will make 16,000 English sized building bricks in 10 hours, but take the whole year through 80,000 bricks per week. As a rule pressed bricks, and plastic wire cut bricks are made at the same time in the same yards, a 35 h. p. horizontal engine is used and it drives both sets of machinery.

The kilns used are what we call Hoffmann's but they are not like Hoffmann's patent, that is, one continuous arch all round, but are a series of arches each 14 feet wide in the clear. Each kiln consists of 14 chambers, six 24x14ft. on each side, and two end chambers 13 feet long by 14 feet wide. The chambers are 4 feet high from floor to springing and 8 ft. 6 in. high from floor to under side of arch. The 12 larger chambers hold 16,000 bricks each, the two smaller chambers 8,000 bricks each. The smoke chamber is surrounded by the brick burning chambers and is 10 feet wide in clear. The chimney stack is 120 feet high above ground level. Each chamber has a separate flue and has two openings into it in about the center of the floor and one opening in the external wall. Each chamber flue has a valve into the smoke chamber, which valve is opened and shut by a rod on the top of the kiln. The external walls are 1 ft. 10½ in. thick, the division walls 1 ft. 6 in. thick, the smoke chamber wall 3 ft. thick. The kiln is tied together with railway rails laid horizontally and vertically and the vertical rails are again held in place by

iron rods across the top of the kiln. The division walls between the chambers have each 6 openings, 8 inches wide by 2 ft. high to let the fire through.

Now as to coal:—

In the arch of each large chamber there are 25 feeding holes (closed by cast iron pots) through which smudge is fed. In the doorway of each chamber is built a temporary fire hole in which coal (nuts) is burnt. There is three times the weight of smudge burnt to one of nuts. Smudge costs 7 s. per ton, nuts 9 s. per ton—but bear in mind a ton of COAL or smudge is 2,352 lbs. weight and not 2,000 as in America. We get what is known as "Colliery weight," i. e., 21 cwt. to the ton.

For the information of your readers generally and your contributor, Mr. Alfred Crossley, in particular, I send you the analyses of our knot clay, made by Michael Scott, F. R. C. E., in 1881.

ANALYSES.

Alumina	1.50
Silicious insoluble matter	66.80
Iron	4.95
Lime	5.10
Magnesia	0.20
Alkalies	Traces
Combined water	6.60
Carbonic acid	4.00
Sulphur	1.28
Carbonaceous matter	6.50
Oxygen and loss	3.07
	100.00

N. S. BLUCK.

Woodstone Brick Yard,
Petersborough, England.

New York News.

Editor Clay Worker:

The building season is well under way and competent experts acknowledge that fully two-thirds more buildings are to be erected in this city this year than were put up last year. Almost the same condition of things are reported from the suburbs, the extensive building operations being by no means confined to Manhattan Island. Beyond the Harlem River there is unexampled activity on the part of those who want small and comparatively cheap homes and the capitalists find the erection of those edifices remunerative. In the eastern district of Brooklyn and at Bay Ridge, at Staten Island, Bergen Point, Baymore, Greenville, and Jersey City Heights—in fact within a radius of 30 miles of New York the building fever—and a legitimate one—has made itself felt, and the

brickmakers are sure to feel the impetus.

At the present moment, however, the brick market itself is dull, and the price, which had been well sustained up to that time, fell about the 2d of May \$1.00 a thousand or from \$6.25 to \$7.25 for Up-Rivers and Best Haverstraws. The reason for the break was very simple. Toward the latter end of April we had almost a week of miserable, rainy weather, and from the 29th of that month to the 2d of May the celebration of the Centennial of the Inauguration of Washington stopped all business here and hereabouts. The two events produced a complete cessation of labor—no brick whatever being laid in the walls—and as the barges from the brickmaking districts continued to come in, and were not unloaded, there was soon a glut in the market. At one time 54 barges containing 12 million of brick were lying idle at our docks. By degrees this amount melted away to 4 millions, and as we are now being favored with excellent weather, it is hoped that matters will soon run along in their regular rut and that prices will bound back to their customary condition.

Among the new buildings projected during the month was one for offices to be erected at the corner of Williams and Beaver streets by the Farmers' Loan and Trust Co. It will be of brick, eight stories in height, and will cost \$425,000. Another office building is projected for the corner of Wall and Broad streets, a handsome synagogue of buff brick with Euclid Stone trimmings, is to go up in 112th St., and a scenic studio is to be erected at Walton Avenue and Cheever Place, four stories in height.

W. K. Hammond, the popular brick commission merchant of this city, has taken the Crossman property at Cold Spring Harbor, L. I., and begin the manufacture of first-class brick there. Four Weill machines are now running steadily, a force of 100 men is employed, and Mr. Hammond expects an output this year of 8 millions.

The brickmakers and dealers were not behind hand when the call for help came from the stricken district in Pennsylvania. The sum of \$1,000 was sent by the Building Material Exchange to the Johnstown sufferers, and individual help came every day.

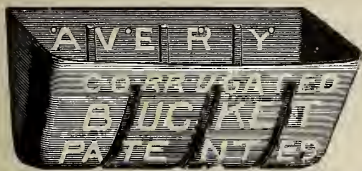
Work at the brick yards at Verplanck's Point began on May 16th, and is going steadily forward. There is no prospect of any more strikes.

The new *World Building* in this city is

to rival that of the *Times*. It will be finished in the fall of 1890, and will be 13 stories in height, surmounted by a dome. Stone will be used in the construction of the two lower stories, while those above will be of brick and terra cotta. The building will be devoted mainly to offices. BRIC-A-BRAC.

THE AVERY STAMPING CO.

The Avery Stamping Co., of Cleveland, O., successors to the Avery Elevator Bucket Co., of the same city, have lately purchased of W. H. Caldwell, of Chicago, Ill., (the patentee and manufacturer of the celebrated Caldwell Steel Screw Conveyor), his patents for Corrugated Elevator Buckets and other sheet metal goods, whereby any article manufactured from sheet metals may be made stiff and rigid, thereby doing away with cross braces, that are found in the old style Elevator Buckets, and which interfere so with the filling and emptying. This corrugation will be a great benefit and improvement, especially in Elevator Buckets, as ear corn, slag, or any rough or ragged material can be dipped up easily, with less friction on a full load, as there are no braces to catch or seams to give away, that cause spilling material down the back leg, as all elevator men well know, braces retard the emptying of Elevator Buckets.



This bucket will make a great saving in time, labor and expense, while doing twice as much work as buckets heretofore used. For large Elevators, as in Chicago, Buffalo, Duluth, and in many of the other principal grain ports, where speed and quick work is especially desired, this new bucket will take the place of the old style now used. They will be made of steel, perfectly seamless, without rivets, solder or seams, any parts of which are so liable to give away. Another great feature is, that they will not be expensive in price, and will outwork three of the ordinary buckets now used. The sizes will be 10x5½; 11x6; 12x6½; 14x6½; 16x6½; 18x7; and 20x7, made of suitable gauges of steel, giving them with the corrugation the full strength and stiffness desired. These buckets will be considerable lighter than the common

ones now used, while they will be much stronger, and parties interested in improving their mills and elevators, desiring samples and prices, can have same by applying to the Avery Stamping Co., or any first-class mill furnisher or mill-supply house, as our goods have a world-wide reputation, and every mill furnisher can furnish same. Freight rates on our buckets are fourth class, while other makes are first class, again a great saving to the buyer.

N. B.—Please bear in mind that we have the only patents ever granted in the world for Seamless, Drawn, Stamped, Pressed and Forged Elevator Buckets, also the only patents ever granted for corrugating buckets, troughs, etc. On small sizes of our Elevator Buckets, taking the weight, boxing, cartage, freight into consideration, it is advisable to ship by express as far as possible, to secure prompt receipt of goods.

THE LION BRICK PRESS.

Editor Clay-Worker:

While enjoying a very busy time of it this season on our Lion dry press, we are often confronted with the remark: "Your press is rather expensive, we can buy other presses for less and are promised the same results."

Without going into the merits of these "promises" we want to place a few figures, before your readers and leave the inference to their good judgment.

Certainly the cost of a plant is to be considered and wants to be in harmony with one's purse, but where there is sufficient capital, the main questions should be: How efficient will the plant be?—How economically will it work?—And will its product be in proportion to the investment?

As to efficiency let us compare dry presses making 5, 4, 3 or 2 bricks on a basis of 8½ revolutions, such as our Lion is gauged to, per minute. The output for 10 hours will be:

On a 5 brick press (the Lion)	25,000 brick.
" " 4 " "	20,000 "
" " 3 " "	15,000 "
" " 2 " "	10,000 "

But if we consider the above referred to "promises" of an equal output per day, the table would be thus: A product of 25,000 in 10 hours would necessitate

8½ revolutions per minute for 5 brick press.	
10 ⁵ / ₁₂ " " " " 4 " "	
13 ⁸ / ₉ " " " " 3 " "	

The former table leads us to the question of economy and it is beyond dispute

that in steam employing machinery the most productive appliances are the most economical, within such a limit, however, as not to increase the help directly connected with it, which in this case refers to engineer (pressman), fireman and feeder. The second comparison suggests the question of quality and considering the importance of making a dry pressed brick as slowly as possible, a glance at the figures will show where the best quality may be expected.

It is not quite as easy to establish comparative tables on pressure, as the means to procure it are not alike; the toggle joint, however, is principally employed and in the case of the Lion is augmented by a lever, whose proportions are as one to six, multiplying the pressure exerted in the toggles, giving 200 tons pressure in the rams, produced by only about 33 tons in the toggle, at the same time securing equivalently less wear on the bearings. The weight of the Lion, 22 tons, (a cut of which appears on page 372 of this Journal), heads the list and is a safeguard against breakage.

Critical readers will easily judge whether a press with such assurances of success in its very construction is "expensive" or not.

Our aim is to cheapen the *running expenses* of a yard and not the first cost of the press.

ST. LOUIS IRON & MACHINE WORKS,
St. Louis, Mo.

Literary Note From the Century Co.

Mr. Joseph Jefferson has been engaged for a number of years upon his autobiography, which will soon begin to appear in *The Century*. No more interesting record of a life upon the stage could be laid before the American public, and Mr. Jefferson's personality is perhaps more sympathetic to the people of this country than that of any other actor we have had. He is the fourth in a generation of actors, and, with his children and grandchildren upon the stage, there are six generations of actors among the Jeffersons. The record which he has made of the early days of the American stage is said to be peculiarly interesting, especially the story of his travels as a boy in his father's company, when they would settle down for a season in a Western town and extemporize their own theater.

The autobiography will begin in *The Century* during the coming autumn, and the installment will be illustrated with a portrait gallery of distinguished actors.



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TESTS OF BUILDING MATERIAL.

We are indebted to Mr. Murrell Dob-
bins, of Philadelphia, for a copy of the
official report of the U. S. Ordnance De-
partment of the results of tests made by
the latter, by request, of material used
in the construction of the new Philadel-
phia City Hall.

We think the following extracts from
the report will interest many of our
readers:

(Pressure per sq. in. sectional area)

Marble Block from Lee, Mass., size
5'' $\times$ 9'' $\times$ 5'' $\times$ 9'' $\times$ 5'' $\times$ 9'', sectional area 34'' $\times$ 87,
ultimate strength 20,504 lbs.

Marble—Montgomery County, Pa., size
6'' $\times$ 40'' $\times$ 6'' $\times$ 35'' $\times$ 6'' $\times$ 02, sectional area 40'' $\times$ 64,
strength 11,470 lbs.

Sandstone—Hummelstown, Pa., size
6'' $\times$ 45'' $\times$ 6'' $\times$ 40'' $\times$ 6'' $\times$ 04, sectional area 41'' $\times$ 28,
strength 12,810 lbs.

Limestone—Conshohocken, Pa., size
5'' $\times$ 92'' $\times$ 5'' $\times$ 85'' $\times$ 5'' $\times$ 92, sectional area 34'' $\times$ 63,
strength 16,340 lbs.

Dobbins Machine-made Hard Brick—
Philadelphia, size 2'' $\times$ 04'' $\times$ 3'' $\times$ 86'' $\times$ 8'' $\times$ 68,
sectional area 33'' $\times$ 50, strength 8,610 lbs.

Hard Brick—(Excelsior Machine),
2'' $\times$ 04'' $\times$ 3'' $\times$ 68'' $\times$ 8'' $\times$ 58, sectional area, 31'' $\times$ 39,
strength 8,310 lbs.

J. R. Huhn Hard Brick, hand-made,
(pavers)—Philadelphia, Pa., 2'' $\times$ 05'' $\times$ 3'' $\times$ 90'' $\times$
8'' $\times$ 11, sectional area 31'' $\times$ 63, strength
18,690 lbs.

Dotterer Pressed Brick, (machine)—
Philadelphia, size 2'' $\times$ 25'' $\times$ 3'' $\times$ 98'' $\times$ 8'' $\times$ 30,
sectional area 33'' $\times$ 03, strength 7,770 lbs.

Sandstone Buff—Ohio, size 6'' $\times$ 03'' $\times$ 6'' $\times$ 52

x6'' $\times$ 03, sectional area 39'' $\times$ 32, strength
6,510 lbs.

Limestone—Indiana, size 6'' $\times$ 45'' $\times$ 6'' $\times$ 40
x6'' $\times$ 01, sectional area 41'' $\times$ 28, strength
10,620 lbs.

Sandstone (blue)—Ohio, size 6'' $\times$ 25'' $\times$
6'' $\times$ 35'' $\times$ 6'' $\times$ 01, sectional area 39'' $\times$ 74, strength
12,420 lbs.

Dobbins' Hard Brick (machine)—size
2'' $\times$ 04'' $\times$ 4'' $\times$ 04'' $\times$ 8'' $\times$ 68, sectional area 35'' $\times$ 07,
strength 11,720 lbs.

Dobbins' Hard Brick—machine (one
corner broken off before test)—size 2'' $\times$ 05
x3'' $\times$ 97'' $\times$ 8'' $\times$ 50, sectional area 33'', strength
9,210 lbs.

Excelsior Hard Brick—machine (made
from dry clay)—size 2'' $\times$ 05'' $\times$ 3'' $\times$ 85'' $\times$ 8'' $\times$ 45,
sectional area 32'' $\times$ 53, strength 5,790 lbs.

J. R. Huhn Paving Brick (hand-made)
—Philadelphia, size 2'' $\times$ 03'' $\times$ 3'' $\times$ 90'' $\times$ 8'' $\times$ 05,
sectional area 31'' $\times$ 4, strength 20,830 lbs.

J. R. Huhn Hard Brick (hand-made)
—Philadelphia, size 2'' $\times$ 04'' $\times$ 3'' $\times$ 98'' $\times$ 8'' $\times$ 20,
sectional area 32'' $\times$ 64, strength 11,150 lbs.

JUDICIOUS ADVERTISING.

One of the puzzling problems in busi-
ness is, how to advertise judiciously.
That there is money in the right kind
of advertising, there is no question.
The fact has been demonstrated over and
over again in the history of so many
business men. But how to get the best
results in advertising is the question;
how to reach the greatest number of
those that are likely to become interested
in a business way, in proportion to the
number reached. The trade journal
that has a good circulation among those
that it is desirable to reach has the ad-
vantage over publications of large general
circulation. To illustrate: A daily paper
may have a circulation of 30,000 and a
trade journal have a circulation of 10,000
—the latter will probably reach ten
times the number of desirable parties.
Indeed we believe the difference is much
greater. A daily paper having 100,000
circulation is not likely to reach more
than one in every thousand that would
be interested in a business way in clay
working machinery. The trade publica-
tion with one-tenth of the circulation
would reach in all probability ten times
the greater number of parties likely to
be interested.

The publication having the largest
circulation would probably charge a
proportionate higher rate of advertising,
or if special rates are made they would
likely exceed by far those of the trade
publication, while in fact the latter

would be worth ten times more than the
paper of general circulation.

But suppose that the shrewd business
manager confines his expenditure of
money to trade papers in his line, how is
he to tell which of several trade papers
will give him the best return? Or must
he patronize all? Publishers of trade
journals are likely to represent that they
cover almost the entire field, and they
may think so. The most enterprising
publishers will cover almost the entire
field. They are enterprising, have the
snap, get there on time, and allow no
expenditure of money to stand in the
way of getting to the front. Prompt
business dispatch must go far to aid in
determining where to put paying adver-
tisements. It matters little what may
be claimed, it is an easy matter to claim
much, and have but little.

A publication of commendable pro-
portions (not in our line) claims 10,000
circulation, and delivers one entire issue
in three mail sacks—this same publica-
tion has a fair advertising patronage.
The publisher depends largely upon his
own representation and low rates of
advertising to keep going—will take ads.
at almost any price.

The shrewd business man that will
closely watch the business methods of
his trade papers will need no great length
of time to determine where to put the
bulk of his advertising patronage. One
excuse after another may be offered to
allay suspicions, but the truth is, that
the enterprising publishers get there,
and that too in a business way.

After having satisfactorily determined
as to the medium through which to
advertise, the next point of vital impor-
tance is, how to advertise so as to attract
the notice of the greatest number, and
favorably impress them.

A shrewd business man in starting
what is now a very popular publication
in New York City, took one entire page
of the N. Y. Daily Herald for one week
to announce in a dozen words the time
when the first number of the proposed
publication would appear, at enormous
cost. A friend meeting the proprietor
of the publication asked, "Why this
waste of money?" The proprietor re-
plied: "Did you see it? "Yes, I couldn't
see anything else," was the reply. "That
answers your question," and turning on
his heel he walked on. The proprietor
years after said it was the best investment
he could have made with the money. It
is not so much the cost, which may be
considerable, but to catch the attention

of those desired, and then in a business way make the representations good. Once in the field with the attention of the trade favorably directed—keep yourself there by shifting the scenes from time to time as it may be necessary, to keep the eye of the trade on the alert for any advance you may make.

It is a business mistake that has cost many a good business man his fortune, to drop his advertising because "trade is a little dull." Some other one having the tact will take advantage of it and occupy the field in the lull of the trade battle and have all eyes turned upon him when the return of activity comes.

Once to the front, hold the ground steadily and actively with good business methods and articles of merit, success is assured.

PAVING BRICK VERSUS ASPHALT PAVEMENT.

The use of vitrified paving brick for the pavement of streets has had such a rapid growth in many of the cities along and near the Ohio valley and in the towns and cities of Illinois, Iowa, Nebraska and Kansas that asphalt pavement manufacturers have become alarmed. To discredit the use of paving brick it has been charged by the *Manufacturer* that an agent by the name of Grant has been paid a goodly sum by asphalt companies to visit various cities and write down the use of paving brick. Further, the *Manufacturer* makes the statement that \$400 was offered a member of the city council of a certain city if he would "work" his council in the interest of asphalt.

The correspondent above referred to, purposely mixed up fire and paving and common clay brick and otherwise made gross misrepresentations of the facts. A special effort has been made to drive out the use of vitrified brick in the State of Nebraska, the city of Lincoln having contracted to lay over 17,000,000 the present season. It is further charged by the *Ohio Valley Manufacturer* that the papers that have published these reports have received the large usufruct in the transaction.

No amount of such venality will drive the use of vitrified paving brick out of the market to give place to asphalt. We have in this city (Indianapolis) a sample of asphalt, laid only last November, that has required quite a good deal of repairing up to this date and there are holes wearing into it that will require further repairs. The few warm days in May

made the surface so soft that the tracks of heavy vehicles may be easily traced by the grooves, and the strong probability is that when the thermometer mounts up into the nineties that the surface will run, or become so soft as to inconvenience the travel. This pavement was laid at a heavy expense and it is evident that it will require much in the way of repairs while it is in use.

The manufacturers of paving brick have little to fear if they will see to it that good pavers are used in the construction of pavements.

THE U. S. STATISTICAL ESTIMATE OF BRICK AND TILE.

"Brick and tile.—Value, \$48,213,000. These figures represent only a small gain over 1887. This is due rather to increase in the number of manufacturing plants than to increased production at the older and more important sources of supply; in fact, many of the latter show a falling off in production. Prices also were generally somewhat lower than in 1887."

The above estimate, in our judgment, is much below the actual product for 1888. It is very difficult to get anything like a full report. That there has been a very considerable increase in the past year—more at least than the above estimate, is apparent to us when we take into account the many new plants that have been established and the plants that have been enlarged. No certain estimate can be made, however, until the returns are received from the Census reports for 1890.

THE WORLD'S EXPOSITION, PARIS.

We expected to present in this issue a letter from our correspondent in Paris touching on the matters of interest to our readers in the great World's Exposition now in progress in that city. Owing to the failure of many exhibitors to complete their displays by the opening day the matter has been delayed.

The Exposition is a vast affair and in due time we hope to lay before our readers an account of the clay working machinery exhibited, if there is any.

The Clay-Worker may be found on file in the educational section of the Exposition which is in charge of Prof. C. Wellman Parks, of the Troy Polytechnic Institute.

For experienced workmen or desirable situations, cheap second-hand machinery, etc., etc., read the "For Sale, Wanted, Etc.," columns.

EDITORIAL NOTES.

Jno. S. Leach, of Muncie, Ind., desires information relative to the manufacture and use of tile for irrigation and would like to correspond with parties informed on the subject.

R. B. Morrison & Co., Rome, Ga., have favored us with a neat four-page circular dwelling on the merits of their Improved Kilns for burning brick and tile, which are proving very successful wherever introduced.

W. G. Halsey, of Galveston, Tex., writes that there is a fine opening there for a practical brickmaker with a little capital. There is an abundance of good clay and cheap fuel, and a good market. Mr. Halsey will be pleased to correspond with anyone desiring further information.

The Avery Stamping Co., of Cleveland, O., have favored us with a neat little book, being a calendar, diary and memorandum combined. It is intended for traveling salesmen to whom it will prove especially convenient and handy. Any traveling man can secure a copy by addressing the above firm.

Senor Ricardo Calvo, Fabricante de Ladrillo, Bogota, South America, writes that he is much pleased with the brick-making machinery illustrated in the Clay-Worker and will probably purchase an outfit. He especially desires information as to the best methods of handling brick from machine to clamps, and will be glad to receive catalogues of conveyors and elevators.

R. A. Speed, Pres. National Brick Mfrs. Ass'n., writes that the brick interests of Memphis are in a flourishing condition. The trade has been very active but the probabilities are that the demand will drop off considerably during the summer months. The Memphis Manufacturing & Brick Co., of which our friend Speed is Secretary, have made nine million bricks this season and if the market requires them will make twelve million more.

R. Melvin, of Chaska, Minn., writes that for some unknown reason he has failed to receive the Clay-Worker of late and adds: "Please look it up and send me recent issues. I don't like to miss a single number. Though I have been engaged in clay work for twenty-five years I find I can still learn much from the Clay-Worker. It not only affords me pleasure to read it but it is a real help to me in business."

EDITORIAL NOTES and CLIPPINGS.

Sheboygan, Wis., is to have a pottery.

Vallejo, Cal., is to have a large brick yard.

J. L. Corder will build a brick yard at Bland C. H., Va.

Jno. W. Fowler, of Laurens, S. C., will urn a brick yard.

W. B. Thornton may build a brick yard at Conchatta, Miss.

A brick yard is to be built at Tazewell C. H., Va.

M. F. Wharton, of Troy, Ky., wants a good, reliable, experienced brick burner.

The Andrews Trip Hammer Brick Co., of Denver, Col., has been incorporated.

E. A. Face will make brick at Mammoth Spring, Ark.

James Townsend will erect a tile factory at Okolona, Ark.

Jno. A. Scott, brickmaker, of Meaford, Canada, has made an assignment.

L. B. Skinner, Dundon, Fla., wants to purchase a roller clay crusher.

Geo. Sackford has started a brick and tile factory near Tipton, O.

Wm. P. Davis is thinking of going into the brick business at Packmart, Ga.

J. R. Martin is thinking of starting in the brick business at Denison, Texas.

Lynch Bros., Scottsdale, Pa., want to buy a clay crusher.

Fred Meigel is building a brick yard at Maple Valley, Wash.

A brick and tile factory has been established at Eagle Grove, Ia.

D. J. Goode is making brick at Bertrand, Neb.

Amos Kent & Sons, of Tangipahoa, La., have put in a Chief Brick Machine.

W. R. Jordan has established a brick yard at Ellsworth, Me.

Watson & Cecil, brickmakers, of Charlotte, N. C., will also make drain tile.

Geo. W. Dearborn is organizing a company to build brick works at Amherst, Va.

Robt. Melcher will enlarge his pottery at Weatherford Tex., and also add the manufacture of sewer pipe.

E. J. Marcom will put in machinery to double the present capacity of his brick yard at London, near Duluth, Minn.

R. L. Davis has started a large brick yard near Chattanooga, Tenn. Employs 60 men.

Knabb Bros. & Co. are constructing a large brick making plant near Atlanta, Ga.

The DeLeon Springs (Fla.) Co. have increased their capital to \$60,000, with a view of enlarging their brick plant.

Walsh Bros., of Catskill, N. Y., are building a brick yard near Stockport Station.

The Collins Brick Co., of Atlanta, Ga., is constructing a yard with daily capacity of 160,000 brick.

The Florence (Kan.) Brick & Paint Mfg. Co. has been organized with capital stock, \$10,000.

T. N. Connor and D. C. Gibson are going into the brick business at Monroe, La.

The Perth Amboy Terra Cotta Co. have increased their capital from \$250,000 to \$300,000.

Chaska Minn has ten brick yards now making half a million brick a day which are largely shipped to St. Paul.

The Cherokee Brick Co., of Sioux City, Ia., will have to put in a larger stationary engine.

The Henry Martin Brick Machine Mfg. Co., of Lancaster, Pa., report a satisfactory trade.

W. C. Henry has started a brick yard at Tracy City, Tenn., having a capacity of a million brick a year.

The Chattahoochee Brick Co. recently built a narrow gauge railroad from their works to their clay banks, eight miles or more down the river.

The Southwestern Brick & Terra Cotta Co.'s works, at Coffeyville, Kan., were burned recently, the fire starting from the roof over a burning kiln.

The Wisconsin Red Pressed Brick Co., of Minneapolis, recently secured a contract to furnish that city with four million sewer brick at \$8.95 to \$9.50.

The Seattle Fire Brick & Sewer Pipe Co. has been incorporated by Jno. Campbell, R. C. Washburn and R. H. Boyle. Capital stock \$50,000.

The Beatrice (Neb.) Brick and Sewer Pipe Co. has been incorporated by A. C. Slith, D. W. Cook, and others, with capital stock, \$250,000.

Overton & Kresterson are starting brick works near Middlesborough, Ky., and E. & F. Watts, of same place are also going into the brick business.

The Meridian (Miss.) Pottery & Mfg. Co. are thinking of adding machinery to their plant for the manufacture of fire brick and tile.

The boiler at Bradford's brick yard, near Charleston, W. Va., exploded recently. Several of the employees were seriously injured.

Jas. Jordan, of Duluth, Minn., recently sold his brick yard there and now intends to start another yard in that vicinity.

The Brown Brick Co., of Rockford, Ill., has been incorporated with \$10,000 capital by R. E. Brown, Thomas Emmett, and others.

Mr. Henry Bucknam, of Columbia Falls, Me., together with Boston parties, will build a brick and terra cotta lumber factory near the former place.

A. M. & W. H. Wiles, of Grassy Point, New York, are making a new Brick Mould that they think is a great improvement over the old moulds in use, and is much more durable.

Gunniss & Seager, of Hancock, Mich., have taken Greely's advice and gone West to Duluth, Minn., where they have

started a brick yard. They have contracts ahead for 3,000,000 brick.

The Jeffrey Mfg. Co., of Columbus, O., report a steady demand for their Elevating and Conveying Machinery. They are running their works full time, and the prospects are good.

McCoy, Ives & Co., Quincy, Ill., report a satisfactory trade in brick machinery. They are now running a brick yard there using the Whittaker Dry Press and have a fine plant. Those who are interested in brickmaking are invited to visit and inspect their works.

Robt. B. Smith, of Chicago is having a good trade in dry press brick machinery. The demand for the Boyd Improved Clay Pulverizer and Stone Separator which Mr. Smith controls is growing rapidly as the merits of the machine become better known.

The Lion Press Brick Co., of St. Louis, Mo., has been organized and are now making 25,000 pressed brick a day with the Lion Dry Press Machine. Opened their first kiln June 1st and found the burn an excellent one. They have begun the construction of another kiln, and will otherwise enlarge their plant.

The Brown & Harrop Mfg. Co., Portland, Ind., write that trade is good with them. Their "Leader" Brick and Tile Machine is constantly gaining in popular favor. They have a new Board Delivery Brick Table that they believe is sure to become a leader with the trade.

A. G. Osman's brick and tile works at Hammond, Ill., were burned recently. Loss, \$4,000. Insurance, \$1,000. Mr. Osman is now looking for a desirable location for a brick and tile factory and will probably select some point in Indiana or Ohio where natural gas may be obtained for fuel.

Jones & Clemans, of Anderson, Ind., report a fair trade. They are using a Chief Brick Machine and dry artificially, having put up a Chicago Iron Clad Dryer with which they are much pleased. They are using natural gas exclusively and contemplate purchasing a repress machine to enable them to make ornamental brick.

David B. Parsons writes from Waterville, a place of 1,300 inhabitants, situated in the most fertile and prosperous section of southern Minnesota, the Canon River valley, that there is a good opening there for a brick and tile factory. There is an abundance of good clay and fuel is plenty and cheap. Mr. Parsons offers to reply to any inquiries addressed to him on the subject.

C. & A. Potts & Co., report trade this spring as good. The demand for their Disintegrators and Sanders being tremendous, compelling them to largely increase their force of men to begin to keep up with their orders. They contemplate enlarging their shop by erecting a new brick building 40x120 feet, thereby doubling their capacity, and enabling them to fill all orders promptly.

Fletcher & Thomas, Indianapolis, Ind., report a continued increase in the sale

THE CLAY-WORKER

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No. 1.

Written for the Clay-Worker.

RESIDENCE OF DR. O. S. RUNNELS, INDIANAPOLIS, IND.

The United States is destined to become the best market in the world for artistic productions. In the development of a new country the capital for a time is

structures intended for public use and also the private residences of our people. The very general distribution of wealth among our people and the effect of teaching the several branches in our common schools that lead to the cultivation of artistic taste and an admiration

designed by the well known architects R. P. Daggett & Company, of this city. It is built of stone, brick and terra-cotta and especially adapted in its arrangement for a dwelling and office combined. The brick used in the walls were manufactured by the Adams Brick



RESIDENCE OF DR. O. S. RUNNELS, INDIANAPOLIS—*R. P. Daggett & Co., Architects.*

invested in laying the foundations for future wealth—in the clearing away of the forests—in the opening up of the highways of commerce and in the extension and establishment of trade relations. Our country has reached a point in the history of its development and accumulation of wealth that justifies the expenditure of money in the employment of the artistic, in beautifying the

for the beautiful is developing a wide spread demand for the beautiful in the decorations of the homes of the people.

As an evidence of this expanding field of industrial effort, we present our readers with the illustration of the residence of Dr. O. S. Runnels, of this city, situated on the northwest corner of Meridian and Second Streets. The building is modernized Romanesque in style and was

Co. of this city and were laid by Mr. John C. Pierson. The brick for the outside walls were carefully selected—of uniform color and size—the outside courses were laid in red mortar with as much care as is usually exercised in the laying of pressed brick. The terra-cotta was manufactured by the Indianapolis Terra Cotta Co. and in artistic execution of design and in quality of material it

is at least equal to the product of any Company in this or any other country.

The entire structure, so faithfully copied by our own artist, exerts an educating influence upon the public who through this fashionable drive; and that it may further serve in developing an artistic taste, we take pleasure in presenting it to our readers.

Written for the Clay-Worker.

BRICKMAKING AND BURNING.

No. 4.

BY J. W. CRARY, SR.

In my third article I gave the common old mode of setting and burning brick. As some persons who are inexperienced and have not read my former articles may profit by a partial repetition of the same, I will state that when a kiln is ready to "fire," the main thing to consider is a "good burn," not a quick burn or a fuel saving burn. It is a foolish boast of the botch burner to talk about his quick burn. This is so common that it is quite the rule to make a bad burn just to brag about the time and fuel saved. Look a moment at the utter nonsense and certain loss of this costly practice of ignorance and self-conceit.

You have been to all the expense of making and setting ready for burning, say 200,000 brick. Now as a common old rule, it will take at least sixty cords of the best kind of wood or about thirty tons of coal, to burn this kiln, or its equivalent in gas or any other fuel, and this is supposing that the kiln is in first rate order for burning, that the clay is easy to burn salmon, *i. e.*, will indurate under a low heat, that the weather is favorable and that the help is ample.

Now suppose when the 60 cords of wood or the 30 tons of coal are used up on the fourth or fifth day of burning, the kiln be closed with 50,000 salmon brick and 10,000 pale red brick. Now the difference between this and a good burn is at least 40,000 salmon and 8,000 pale red. Loss by 40,000 salmon, \$80 at least; on 8,000 pale red, \$20, equals \$100 loss in selling price besides loss of labor in handling, \$10, equals \$110.

Now suppose the "boss burner" to be competent and that he tells his employer that he can make a first rate burn if he has five cords more of wood or its equivalent in the fuel he may be using, and 10 or 12 hours more time. The cost would be six \$15 for fuel and \$5 for labor, equals \$20; but "no," is the answer and the kiln is closed up at a loss of \$90 together

with the bad name "poor burn," "poor brick," or "salmon burn." So here is the actual damage of \$90 and an unknown incidental loss in reputation.

I have known hundreds of kilns to be treated in this way. In fact, first rate brick burning is the exception, not the rule. I have burned a kiln of reset salmon brick in twenty-six hours and several kilns dry, green brick in three days and nights, and although they were called good burns I found that in the same clay I could make a brick 50 per cent stronger by burning six or seven days and with only a trifle difference in cost.

TRUE THEORY OF BURNING CLAY TO PERFECTION.

Six pounds of strong clay when dry as the air will make it, still contains from six to eight ounces of water and brick set up in a kiln will average ten ounces of water to each brick. The pores of a mud brick are very small and of a dry pressed brick still smaller. Now it is perfectly plain and evident that when a brick be heated above the boiling point, an instantaneous expansion takes place in the absorbed water and the crystallization or cohesive attraction of the particles of clay must be disjoined to a certain extent so as to allow the excess of steam to escape. The whole body of the brick is thus suddenly expanded and softened and if not perceptibly "water settled" it is in fact so, to a certain extent, and however hard the brick may be burned it will be imperceptibly fractured and lose its ring and solidity.

IN THE DRYING OFF PROCESS.

Brick should never be heated above the boiling point until the top of a kiln is quite warm to the touch all over. After this, the fires in the arches may be slightly increased so that the overhangers will look a little bright after dark, but in no case should the furnaces or arches be made red hot until the steam or water smoke begins to disappear rapidly. There are two words for a brick burner to get by heart and never forget, *viz.*, slow and regular. If the aphorism "more haste than good speed" has one place better than another it is in the practice of the average brick burner trying to save time by pushing his fires or opening his kiln too soon after being burned. No matter how little or big the kiln, if the height be the same, it requires the same length of time to burn it. I have burned 700,000 brick in a kiln 48 brick, on edge, high, in a little less than seven days. The kiln did not

settle a particle, was perfectly hard from bottom to top; and I have been a full week burning 100,000 the same way in the same kind of clay.

If the settle of a kiln be the criterion for a good burn, the slow, steady, heat well diffused throughout the kiln is the only sure way. A settle should never be attempted until the fires are all out to a glowing heat on top. The man who settles his kiln until in this condition, is either a willful botch or a senseless ignoramus.

HOW TO MAKE AN EVEN SETTLE ALL OVER THE KILN.

The old way of setting one head or side at a time is an exploded idea with brainy brick burners. A clamp or kiln twenty-two feet wide should have a furnace at least four feet deep, or out, from the brick in the kiln. If the wall of clamp or kiln is not that thick, a flue or furnace should be built out so that the main part of the gases generated by the furnaces will not be mixed with fuel (wood or coal) thrown over into the arches. The old idea of sliding or throwing large quantities of fuel over to the center of a kiln is a positive waste of fuel, without any really beneficial result. If there be a deficiency of oxygen to consume the wood or coal thrown over to the middle of arches the fuel will carbonize and that will retard or even destroy combustion. If coal be used, the grates should be thinly covered and the ashpits should be often cleaned out. When any part of the kiln begins to settle, the plating should be closed tight at that part so that no more draft will concentrate at that point but be forced to other unsettled parts of the kilns. This process of closing the plating should go on until the settle is even all over the kiln, and if the plating cannot be made tight, raw, damp clay should be thrown on so as to compel the draft of heat to go to the unsettled places. By this means I have often settled a head clear out nearly level with the middle.

WHEN THE KILN IS TO BE CLOSED AND HOW.

If the clay will fairly settle six inches, as soon as it has gone down four you may safely believe it will settle two inches more because the top of the kiln being closed the intense heat below will naturally ascend and as it can only radiate from the top, of course, the heat will be very nearly equalized throughout the kiln and the second course from the top will be good hard brick. When the kiln is to be closed no fresh fuel should be added to the furnaces and the gases

have been consumed, so that no smoke is visible, should be spent until the arches have an even glow of a settling heat, then quickly close the doors and shut off the draft as soon as it is safe for the grates, which will not exceed one hour. The usual way of charging the arches with fuel on closing up a kiln, is sure to discolor many of the brick, because the combustion, or rather, the consumption of the the fuel, for the want of oxygen, is incomplete, and the carbonic oxide discolors the mineral oxide which gives the natural color to brick.

We see and hear a good deal about burning brick with natural gas. This is an important subject in localities where gas can be had, but in most places we must generate the gas by the proper combination of some kind of fuel and oxygen. Brick burning is not a question of fuel or heat, but a question of the right and best application of heat, and cooling or withdrawing of heat. It takes a certain quantity of heat, or caloric, to produce that chemical change in clay necessary to oxidate its natural constituent parts to that state of induration which affords the most consistent hardness, strength, tenacity and durability.

THE SETTLE OF A KILN NO SURE SIGN OF A GOOD BURN.

That kind of clay which is generally used to make the best red brick, will shrink about an eighth of an inch in the width of a brick; that will give five inches settle in a kiln forty brick high. But we often find such a kiln settled 8 to 10 inches or more and the arch brick a half inch less in width than a brick in the middle of the kiln and in the difference in settle from the bottom to top is in ratio to the number of courses. This may be called good burning but it is because there is no better. Why not have the superlative and get the best? It is simply a question of time, distribution and equalization of heat. Any experienced brickmaker of first rate judgment and sense (and no other sort of a man ever was or ever will be a first rate brickmaker) will soon find just how much heat his arches will stand without signs of fusion. Then if the brick are properly set so that a free, clear draft can ascend, he has only to keep the heat steady, uniform and regular, until the same color or glow of heat can be seen down a course or two from the top as is seen in the arches and when this sign is plain and unmistakable, he may close the kiln without regard to the depth of

settle, and uniform well burned brick is the certain result. Any other criterion for a good burn is deceptive. The settle of a kiln may be mostly in the arches while two-thirds of the brick above are only pale red and salmon.

In my next article I will say something about our infusible clays that don't shrink in burning and require intense heat and will also tell common brick burners in fusible clay how they can make their arches stand fire. Before I conclude these articles I will show how to utilize the heat of kiln after being closed to dry off other kilns which can be set up at little expense for continuous burning. I will say right here to finish my remarks about setting arch bricks, that the common way of setting benches and overhangers, by setting one brick on two, right over the space between the two, is without reason or common sense as it only makes cavities or ovens which confine the heat and gases not allowing escape up into the body of the kiln. The benches, overhangers and binders should be set skentling (reversed diagonally) with a space between at least 5-8ths of an inch. There should be a free full escape for draft up from bottom to top of kiln. "Benches" may be four brick wide for clay easy to melt and five brick wide for clay that will stand a high heat.

Written for the Clay-Worker.

CLAY, IN ITS CHEMICAL, MINERAL AND ECONOMICAL RELATIONS.

BY PROF. R. T. BROWN.

Familiarity breeds indifference, is one of the strange truisms that characterizes our common humanity. The things that are constantly before us we know less about than those which we see only occasionally and at long intervals. Clay is in the soil we cultivate and in the earth we walk upon daily. Scarcely an out-door hour passes that does not give us an opportunity to study the properties of clay and yet how little do even intelligent men, know about it?

The solid mass of our globe consists, substantially, of three proximate elements, to-wit: Silica, Alumina and Calcia, or in plain English—quartz or flint, clay and lime. The other thirty or forty mineral substances known to chemists are but auxiliary to these and are comparatively rare while these are found almost everywhere. Clay and lime are oxides of metals and silica is an oxide, but the metallic character of its base has not been demonstrated. Aluminum is a white metal nearly as hard as silver, ad-

mits of a high polish, but has not the lustre of silver. Its specific gravity is 2.60, being but little more than $2\frac{1}{2}$ times as heavy as water. It forms alloys readily with other metals the most valuable of which are those with copper and iron. It is the most abundant of metals and yet maintains a high commercial value in consequence of the difficulty of reducing it to the metallic state. It forms but one compound with oxygen, that is what us chemists call a sesqui-oxide. It consists of two parts of aluminum combined with three parts of oxygen. This is the compound known as alumina. It is a feeble base and combines with acids to form alums and similar salts, but in the presence of a strong alkali it acts the part of an acid.

In this way, it combines with potassa and this compound unites with silica to form the mineral known as feldspar which is a constant ingredient in granite and other primitive rocks. In our bowlders it appears as beautiful crystals, generally flesh-colored and softer than crystals of quartz. It is from the decomposition of feldspar that all our clays are derived. Our clays are, therefore, silicates of alumina; but in the ordinary form of clay it is, in chemical language, a tri-hydrate; that is, each atom of clay combines with three atoms of water which it holds at all temperatures below 360°, at which heat it parts with two of these atoms of water, but holds the third up to a white heat, at which point it yields up the remainder with a shrinkage of about two per cent. of its volume. The first loss of water is visible in the water-smoke of a kiln. This loss is accompanied with little or no shrinkage, the space occupied by the water remaining as pores. But when the final equivalent of water is displaced, the heat has reached a point at which the material has become so soft that when the water is driven off the space it occupies is closed and the whole size of the brick is diminished by that amount. This is seen in the settling of the surface of the kiln and indicates the desired change in the chemical composition of the clay. A brick, or other clay work, is never effectually burned till the water of hydration is all removed. After this change we know of no process by which the clay can be hydrated again and restored to its original plastic condition.

If uncombined silica be present with even a small amount of lime or potash, (which is generally the case) vitrification will commence at a temperature but

little beyond the point indicated above. This will demand caution in any increase of heat after the kiln has begun to settle.

Pure alumina has never been fused by any heat we have been able to produce, but we know that in the great laboratory of Nature there has been a heat sufficient to fuse it, for we find it crystallized in the sapphire and ruby which would demand a liquid condition. These gems are pure alumina crystallized and except the diamond, are the hardest substances in nature. Corundrum is an uncrystallized form of alumina and in a pulverized condition it is known as emery. We have a number of minerals of which the silicate of alumina is the base. Prominent among these are feldspar, chlorite, hornblende, talc and the various forms of schistose rocks, of which the roofing slate is a good example. Indeed, there are but few minerals in which alumina in some form is not a constituent element. Its chemical properties are peculiar. While its affinities are not very active, yet when it forms combinations with other bodies, they are the most persistent and difficult to break up of any in the whole range of chemical action. This feature interposes the chief obstacle in our efforts to reduce aluminum to its metallic state and it is that which gives to well burned clay its unlimited durability.

In the useful arts, clay occupies so broad a field that the limits of this paper forbids that we should attempt to more than enumerate a few of its economical properties. Clay has a strong affinity for the elements of organic bodies, as decomposition liberates them. Animal or vegetable substances covered with clay but a few inches deep will, undergo decomposition without any indication of it on the surface. Dry clay will absorb and hold its own weight of water, and yet it is not soluble in water, even in the smallest degree. In agriculture, clay is an indispensable element in a fertile soil and yet it enters none of the growing crops. Lime and silica, the other mineral elements of a fertile soil are found in nearly all growing vegetation, but clay while it ministers to all the wants of a growing plant, furnishing moisture and the fertilizing gases, yet of its own substance it furnishes nothing.

Clay is the only known substance that can be reduced to a plastic condition in which it can be moulded or wrought into any desirable form and that shape made permanent by heat and retained indefinitely against the destructive agen-

cies of fire, water and time. These properties point to clay as the most valuable building material of which architecture can avail itself, not only for substantial walls but for durable and cheap ornamentation as well. Even in its unwrought state clay bids defiance to time. Had our ancient mounds been built of stone, the progress of decay would have given us a data from which to have estimated their antiquity; built of clay as they are we have nothing on which to base even a conjecture of their age.

It requires no prophetic ken to see that in the progress of the arts these wonderful properties of clay will be made to minister to human wants in a thousand ways of which we have no present apprehension.

Written for the Clay-Worker.

COLOR OF CLAY WARES.

BY D. W. STOOKEY.

The subject of color in clay wares is one of the most difficult as well as the most interesting problems with which the clay worker has to contend. He very often finds some pieces of his ware that are colored a beautiful and popular tint and fancies that he has both fame and fortune in this particular bed of clay, but experiment teaches him that the desirable color in ordinary clay wares is an *ignis fatuus* that eludes his grasp until, like the deluded traveller who pursues the mirage on the sun heated desert, exhausted and dejected, he despairs of ever realizing his once fond hopes and becomes a victim of the fickleness of the color goddess.

As the intelligent, inquiring mind has penetrated the mystery of the Will-o'-the-wisp and learned the secret of the tantalizing mirage, so careful observation, aided by known scientific truths, may go far towards learning the whys and wherefores of the apparently unaccountable variations in the color of burned clays.

In these days of art educations and cultivated eyes the public requirements have become more and more exacting and the color problem of the clay burner proportionately more difficult. Slight variations in the color of the brick in a wall are readily detected and the artistic combinations of differently colored pieces of brick or terra cotta work require great nicety in the selection and arrangement of variously tinted pieces.

In this connection a few reflections on color in general may not be out of order. Color has been defined as a property of

light. In Webster's unabridged dictionary the following definition is given: "A property depending on the relations of light to the eye, by which the mind is capable of distinguishing individual and specific differences in the hues and tints of objects which are apprehended in vision." Here color is made dependent upon the existence of the eye, whereas, the grass would be as green and the snow as white if no eye had ever been created to "apprehend" them. This brings up a discussion based upon the definition of the word similar to the old one with reference to the sound produced by firing a cannon beyond the hearing of all ears. But such discussions are only suited to the country debating society.

Sunlight is accepted as the standard by which all lights are compared and is considered as white light or pure light.

If a pencil or ray of sunlight be allowed to pass through a prism it becomes dispersed or separated showing all the tints of the rainbow. These colors imperceptibly merge into each other, but it is customary to consider them as seven principal colors. Bodies have the property of reflecting a portion of the light they receive, and their colors result from the fact that a part of the colored rays contained in white light is absorbed and a part is reflected. Those bodies that reflect all the rays they receive appear white while those that absorb all seem black. A body that absorbs all but the yellow rays seems yellow and one that only reflects red rays looks red.

As chemical action and mechanical structure or condition as induced by heat are the results sought after and obtained in the process of burning we may learn something about color as produced in the kiln by studying this subject of heat as an agent in producing chemical changes and as a modifier of physical condition. Heat is an important agent in producing chemical action and it is well known that certain chemical combinations and separations takes place more readily and rapidly by the application of heat. A very common example of this is found in the burning of coal and wood. The carbon of the fuel may be in contact with the oxygen of the air but they do not combine rapidly to form carbonic acid until heated or a fire is started. Again the ingredients of a match do not unite until heated by some external means such as friction. Sulphur and oxygen do not act upon each other at ordinary temperatures but they readily combine and form sulphur-

ous acid when the temperature is raised. Certain compounds are decomposed by heat which imparts to their elements an unequal expansibility. This is true of many metallic oxides. Iron disulphide, which is commonly called iron pyrites or fool's gold, readily decomposes when heated. The sulphur and the iron each uniting with the oxygen of the air. In a similar manner heat facilitates chemical change between the constituents of the clay. As the temperature rises chemical action becomes more vigorous and new combinations between the ingredients of the clay are formed. Color is also modified by the kind of fuel used in burning the kiln. Fuels have impurities and many of these are volatile at the temperature reached in burning clay wares. Some of these volatile substances unite with the constituents of the clay and thus influence the color. A familiar application of this is used in the production of a salt glaze. This is obtained by throwing salt into the furnaces while the ware is heated to a high degree, when the salt is volatilized and undergoes decomposition on the heated surface of the ware causing a deposit of a fusible silicate upon it and giving it new colors.

Heat also influences the color of the clay product by melting some of the fusible constituents of the clay. These, in the melted state, combine either chemically with some other constituent or mechanically unite to form a mixture that reflects or absorbs light in its own peculiar manner. The melting point of any substance is constant and it will melt whenever the temperature reaches its particular melting point. With the graded temperature of the different parts of the kiln there will be places where this change has taken place and others where it has not. Different substances have different melting points and while the temperature of some part of the kiln may have reached the melting point of one substance it may be below that of another. Those places nearest the fires may have attained the melting points of several ingredients with a decreasing number as the distance from the sources of heat increase. As different changes take place at different temperatures there is a constant change in the clay as the burning progresses and the different parts of the kiln being unavoidably of different temperatures at the same time there will be, as a necessary consequence, a variation in color grading from the hottest parts of the kiln to the coolest.

The presence of water or moisture in greater or less quantities influences chemical action and as water is decomposed at high temperatures especially when in contact with certain substances as iron the condition of the kiln, fuel and wares, as to the moisture, will exert an influence upon the color of the finished product.

The ordinary clays are very complex in their composition and the fuels, with their attendant impurities, furnish an almost innumerable and ever varying list of ingredients. The possible separations and combinations of this host at the varying temperatures of the kiln may naturally be expected to produce a vast array of colors, shades and tints in the finished wares.

The difficulty in obtaining uniformity of color has stimulated much investigation and experiment and various plans have been tried to obtain the desired results. The simplest and most natural method is that of selecting the pieces when taken from the kiln and grouping them according to the different shades of color. Artificial methods have been practiced with varying results. These primarily consist in the use of coloring matter which is acted upon by the heat in burning in such a way as to bring out the desired tint. The coloring matter is sometimes mixed with the molding sand and others incorporate it with the clay before it is given the desired form.

BRICK PIERS.

The only way to build a good and substantial pier of brick is to lay each course the full size of the pier, and not to, as is often done in this city, build up the outer four inches of the pier seven or eight courses high and afterward fill in the interior, as it is impossible to get proper bed or bond; brick of the hardest quality only should be used where heavy weights have to be borne. Avoid bats and use as little mortar as is necessary to get solid work. Make the size of piers so that whole brick can be used to obtain proper bond; tamp each brick after it is laid in position with a hammer or brick.

In small piers lay the brick on a bed of mortar and flush up solidly every course; in larger piers make a joint or rub on the bed and lay headers every fourth course. If bond stones are to be inserted, the joints should not be too tight, say from three-fourths to an inch in thickness, the larger the pier the larger the joint, and bedded high in the

middle, and in no case on the outer edges of the pier only. Use cement in all mortar in connection with lime, and wet the brick in all cases where there is not any danger from frost; where iron plates or cols set on bond stones, the plate should cover the bond stone as nearly as possible. The present custom of laying brick in dead walls gives one the impression that the quantity of work done is of far more importance than quality. The only way to obtain good solid brick walling is to either flush the joints solid with mortar every course, or make a shove joint; the former method takes too much time, and the latter is rarely done except in very heavy work.

The custom generally adopted is to spread the mortar on the brick (a portion only of which gets in the joints) and lay the brick on top, each succeeding course being bedded in mortar, but the longitudinal and cross joints are only partially filled. Grouting with cement mortar every two courses in height might be adopted for basements and first stories of buildings where unusual strength is required. Full headers for face brick are better than clipping, and should be specified for all heavy buildings. The face brick are often built up fifteen or twenty courses high before the backing up is done, and thus the wall is never well bonded and sufficiently tied together.—*Building Budget.*

Written for the Clay Worker.

POTTERY.

BY H. C. WILLIAMS.

The terra cotta worker probably has often asked himself why it is that works reflecting upon his industry are so much given to pottery and so little to the more utilitarian productions that go into house building and the like. The answer is two-fold. In the modern sense, architectural terra cotta is too recent to have a history, and the ancient productions in this line have many centuries since crumbled back into the primitive clay—a few specimens from the mounds of Nineveh and the ruins of Rome represent nearly the total of our knowledge of the productions of the past.

Yet, few as these are, they have furnished models for most of the popular designs of to-day, and the magnificence of the ruins of terra cotta work, although the storms of thirty centuries have aided in the work of decay, tell us that as builders in terra cotta we are yet in our infancy. The writer was struck with the force of this idea as he passed a building

in process of erection in this city. The body of the building was brick, the pilasters were of pressed brick (in which we can beat the most professional Assyrian brickmaker) interspersed at intervals with layers of rough stone. The capitals of the pilasters were pressed terra cotta imitations of palm leaf filigree, borrowed, without a particle of alteration from the conventional usage of an age in the prime of Assyrian terra cotta, and were borrowed bodily from the ruins of Nineveh. The effect in detail and combination was happy, and we hope to see more of this borrowing, if one were to call it such, for in all architectural work that is not meant to endure for an eternity, as in store fronts and dwellings, the terra cotta industry will be improved in its art and its pocket exactly as it adapts itself to the wants of the popular taste for adornment, and does it at a price that places its art within the reach of the



popular purse—provided it can do it well—as well, for instance, as the worker of the old Nineveh did it. And remember that this almost anti-diluvian worker met the popular taste, because the entire building genius of this people was driven to clay for building material—to the mud flats of the lower Euphrates, and far from the stone quarries that developed the genius of other nations into stone productions. In this witness the Greeks, the marble Mount of Pentellicus, within a stone's throw of Athens, and an absence of clay, made the Greeks creators in marble. Witness again what marvels we Americans have made in wood—works of architectural art out of lath and shingles, and because we have had wood *ad nauseum*,

To be sure our clay is being opened, and what is more, developed into forms of art and beauty—and what is equally important, in a way that insures finish and durability (matters in which we beat the ancients). But as we said before, this development is so recent that it is just now bearing fruit.

But we begun by volunteering an explanation why fictile productions, as vases and the like so much predominated in works devoted to the terra cotta art. The urn, the amphora and the vase were nearly universally used as receptacles of votive offerings for the dead, and placed in tombs—structures that either were built in massive form above ground or were excavated out of it, and hence have escaped the ravages of time and the destruction of conquering hordes. Therefore they have survived, to tell us of the art materials that were common in the past. Besides, the best efforts of the art were expended in the ornamentation of these wares, and many of them afford studies that require but little of adaptation to render them subservient for decoration for almost any purpose that an artistic design could be used. In addition, their study will enlarge the mind and awaken the capacities of any in-born artist who will take the trouble to work the mine thus opened.

We do not urge upon the maker of builder's terra cotta to waste his time and energies in the decoration of vases, or "china" ware. This is the proper field only for one who follows this as a business, but we do urge that their decorative forms be studied for the fertility of conception they will afford, and the adaptiveness their many and beautiful forms will suggest, and which may be used in a thousand different ways to add to the beauty of architecture, and to educate the sense in the application and conception of beautiful forms.

There be those who would urge against this adaptation of the works of the past because of a fancy that one should create his work out of his own hand and brain. If a savage were to attempt to create civilization out of his own resources and single experience, we could readily imagine the "civilization" or rather the want of it. It has taken two hundred generations of men to produce what we have around us to-day. While we have gained, as to the whole, we have lost much that is valuable, and some that is indispensable. Civilization is the collective brain of all mankind, and it is the true genius who can take the work

and art of another man, invented and used for a different purpose, and adapt it for a new purpose and one undreamed of by the original inventor. Napoleon, with all his genius condemned the invention of Robert Fulton (the steamboat), yet it is not going beyond possibilities to say that if he had adopted it he might have worn his imperial crown in London instead of wearing his soul out at St. Helena. In the light of present experience, he needed but this to wipe out at a blow the naval supremacy of England.

It is necessary for all who would succeed, to study the works of others, and it is absolute, if success be achieved that their work be properly adapted. There is really but little new under the sun. As an instance of this take the illustration which we present with this paper. We give it in two forms. Fig. 1 is the bas relief on a Ciniary urn of the Rom-



an period. Fig. 2, is the same with the inscription in the center and foot piece removed, and presto, we have a beautiful and artistic modern fire-place, that would be the "fad" anywhere it were introduced. The capitals of the pilasters on either side would serve with excellent effect at the head of the pilasters of a store front. The head piece would adorn a frieze, or take up any space required where a flat surface were to be relieved.

This illustrates what we mean by the capacity of adaptation and it illustrates also its method. It also illustrates the necessity for study of the works of men who have gone before, without this there can be no adaptation—or one so crude that it would fail in adaptation.

A little imagination will tell the reader a multitude of purposes that our illustration subserves, *if they be happily applied*. The world is full to overflowing with forms of truth and beauty, both in art and nature. The magnificent Corinthian capital, the very blossom of classic architecture, was borrowed, so 'tis said, by Callimachus who saw a basket covered with a tile in the center of an acanthus plant that was growing on the grave of a young lady of Corinth, and who copied it. This may be true or false in the specific sense, but it illustrates our text, the habit of observation and adaptation.

Written for the *Clay-Worker*.

GENERAL REMARKS CONCERNING BRICKS

Their Sizes, Strength, and Other Qualities, Ornamental Bricks, Blue Bricks, Etc.

BY CHAS. T. DAVIS.

Bricks are commonly rectangular moulded blocks of clay, burned, and used for purposes of architectural and engineering construction; but the term is also applied to the moulded clay in its crude and unburned condition, in which state the bricks are said to be "green."

Adobes are bricks that have been dried by the heat of the sun and not burned with fire, and they are used mostly in countries of the East and South that are free from frost, in which the atmosphere is dry and warm.

An adobe may be reduced to a state of permanent plasticity by being kept mixed with water, and again become clay; but a brick which has been burned can never be again converted into that condition or substance.

A burned brick may be pulverized into a powder, in which condition it will be a cement and when mixed with a small quantity of water will harden into a mass, or when mixed with a large quantity, it not being hydraulic, will settle at the bottom of the vessel and form into a substance resembling sand.

It is a fact peculiar to Spanish countries that ordinary brick dust, made from hard-burned, finely pulverized bricks, and mixed with common lime and sand, is universally successfully employed as a substitute for hydraulic cement. Mr. A. E. Miles says that during an engineering experience of some six years in Cuba his opportunities were ample for testing its merits, and he found it in all respects superior to the best Rosendale hydraulic cement for culverts, drains, tanks and

cisterns, and even for roofs. In an experiment to test the strength of this product it was found that a block of it one-half inch in thickness without sand, and after an immersion in water for four months, bore without crushing, crumbling or splitting a pressure of fifteen pounds per square inch. It is thought that, by the addition of pulverizing mills to the brick yards to utilize the waste and broken bricks a profitable manufacture might be conducted.

American building bricks vary in size in different localities, and often there is a diversity in the same location the measurements for common bricks running from $7\frac{1}{2}$ to $9\frac{1}{4}$ inches in length, $3\frac{1}{2}$ to $4\frac{1}{2}$ inches in width, and from 2 to $2\frac{1}{4}$ inches in thickness, which variation is largely owing to the nature of the clay employed.

Strong clays absorb a large quantity of water in tempering, and as the bricks made from this class of clays dry they become much smaller, and when placed in the kiln and burned their size is again greatly reduced by the action of the heat and bricks made from this kind of clay that were of a large size when moulded are often small and undersized when they come from the kiln. When this is so the strength of the bricks is not impaired, the principal objection to their use being that a larger number is required.

Bricks made from weak clays absorb but little water in tempering, and do not shrink much in either drying or burning. Both hand-made and machine-made bricks are similarly effected in size from these causes.

A difference in the thickness of hand-made bricks is often caused by the wearing of the moulds, new moulds being generally used in the spring, which gradually wear thinner until in the autumn they have lost from one-eighth to three-sixteenths of an inch in depth, and bricks made in the fall of the year being correspondingly thinner than those made in the spring. The loss of one-eighth of an inch in thickness of a brick may appear to be a very small affair; but it is not as insignificant as it may at first sight seem.

To lose one-eighth of an inch in one course of bricks in its thickness is to lose one inch in height in every eight courses, or one foot in every twenty feet of elevation. In a medium sized house, say 25 feet front by 60 feet deep and 60 feet in height from foundation to finish, the walls being one brick and one-half

in thickness, which with chimneys and inside walls would girt about 200 lineal feet the loss would be about 600 cubic feet of brickwork or over 10,000 bricks as the walls would in that case require 18 bricks to the cubic foot.

The loss would also be in laying the quantity of extra bricks, and as the bricks and laying would cost in the neighborhood of, say \$15 per thousand, a needless loss of about \$150 would be inflicted either upon the owner or the builder, which would depend upon the circumstances governing the case.

The fact should be remembered, and engineers and architects having in charge large undertakings, requiring a long period for completion, and great quantities of bricks should expressly require that all moulds that are subject to friction and liable to loss of depth whether they be hand moulds or machine moulds shall be renewed not less than three times in each season. This should be done for the protection of their clients if they should be furnishing the bricks, and if not, then for the good of the contractor and also for the purpose of keeping the courses level and uniform throughout the work.

In the District of Columbia the authorities still enforce the ordinance of October 31, 1820, which requires that all moulds used for making plain bricks within the city of Washington shall be "stamped as correct by the sealer of weights and measures, and be $9\frac{1}{4}$ by $4\frac{1}{2}$ and $2\frac{1}{4}$ inches in the clear."

"Stock bricks are to be made in moulds $2\frac{5}{8}$ deep in the clear." All persons who violate this law are subject to a fine of \$25.

English bricks are larger than those commonly made in this country, being usually 9 inches long $4\frac{1}{2}$ wide and $2\frac{1}{4}$ thick, after burning, but they are not so strong, and are generally of an inferior quality.

In fact those made by the London brickmakers are of the weakest sort caused partly by the nature of the clay used but principally from the habit of mixing ashes in large quantities with the clay; as the domestic ashes which they use contain a large quantity of unburned coal, which is reduced to ashes in the process of firing, leaving the brick very porous, greatly weakened, and generally shaky. This system is very undesirable for two reasons: first it is certainly injurious to the health of those who live in the neighborhood of the stacks, as refuse, frequently mixed with decom-

posed animal and vegetable matter, the contents of dust holes is used in the process of burning; second, the matter of this kind which is sifted and mixed with the clay, pieces of bone and other substances of a similar objectionable character not being infrequent is certain to yield an undesirable excrescence arising from nitrogenous substances, some of the evil effects of which have been described in the preceding chapter.

The most nauseating fumes often arise from the stacks of bricks made and burned in this manner as the "soil" or finely sifted ashes used for mixing with the clay is offensive to the smell in either a dry or moist condition; the coarser material or "breeze" contains some coal, but also a large quantity of rags, bones, oyster-shell, hair, corks, etc., all of which tend to make the immediate neighborhood of one of these clamps anything but a desirable place for a residence, especially in the hot close months of midsummer, which is the period during which the greater amount of this kind of brick burning is done. Day and night, for weeks and months, a great many people are compelled to breathe these sickening smells from this source, children pine away and die, the vitality of a great number of older persons is sapped away in the vicinity of these London clamps, and English people who never let an opportunity pass to find fault with our hygienic systems, and set themselves up for models for us to copy, and, in fact, they as much as say: "Look at us, follow us; we take good care of the body, we suffer nothing of a public character to undermine our health, while you do everything with such a rush that you do not take the time to pay any attention to the laws of health, and proper care of your bodies."

Outside of the heart or thickly-settled portions of London, I do not believe that there is any one thing that is doing so much harm by poisoning or polluting the atmosphere as this extensive system of clamp burning.

Suits to suppress this nuisance are sometimes brought, in fact, are not uncommon; but those who institute such proceedings generally push them with so little vigor, and do not appear to have made any organized effort through the co-operation and help of their neighbors to suppress the system, that the courts do not seem to have had the cases at any time properly presented to them, and the defendant generally escapes by the payment of a most insignificant fine.

The habit of some of the brickmakers at Haverstraw, Croton Landing, and other places on the Hudson River, of mixing fine coal with the clay has the same effect of weakening the bricks.

Pressed or front bricks are generally hand-made bricks that have been pressed when nearly dry in a hand press, and in their crude or green condition, they are called "gluts," and it is very essential that the clay of which they are made should be carefully selected and tempered. It should be free from gravel and other defective substances.

Machine-made bricks are sometimes repressed in a hand-press whilst damp, and make a second quality of pressed or front bricks, and generally sell for about one-half the price of the finer grades. Pressed bricks are usually slightly larger than common bricks, being generally made of weak clay in order to give them a rich color; but the same causes that have been named above as changing the size of common bricks apply to this finer grade of bricks.

Great pains are taken with pressed bricks to preserve the corners and edges which are called the "arrisses," and the brick are carefully taken from the kiln the defective ones being culled out, and the perfect ones assorted for a uniformity of color, the light-colored being hacked together, and the medium and dark-colored being also kept separate, all the culling, assorting and hacking being usually done under a shed built for that purpose.

Machine-made brick shrink less in drying but more in burning than hand-made bricks.

Burning common bricks are usually divided into three classes: arch, red and salmon; and when made from the same class of clay, the salmon bricks are the largest in size and the greatest in weight; the red bricks are the next in size, and the arch bricks are the smallest in size and least in weight. The average weight of burned bricks is about five pounds, but individual weight depends upon and varies with the size, the amount of pressure to which the clay is subjected in tempering and moulding, the heat received in burning, the class—whether red, arch, or salmon, the kind—whether made by a dry clay machine, a slush machine, a damp clay machine, or hand made. The average weight of a cubic foot of brick is 110 pounds.

Tredgold gives the average specific gravity of brick as 18.41 and the cohesive force of a square inch as 275 pounds. He

probably got hold of a very weak brick, for when the cohesive force is less than 400 pounds, the brick is not worth laying in any building where strength is a requisite.

A good quality of hard-burned bricks, especially when intended to be used in buildings of a public character, when hand-made or machine-made, should withstand a pressure of not less than 7,000 pounds to the square inch, or about 450 tons to the square foot, which is more than good granite, and three times as much as good building stone will stand.

This may seem to be an extraordinary requirement, or it may be called an impossibility by some; but that it is not difficult to find bricks that will stand even this enormous pressure and some a great deal more, will appear from the following tests made by direction of Gen. M. C. Meigs, of the U. S. Army, who has been intrusted by congress with the erection of a building for the use of the U. S. Pension Office, and which is now (1884) in course of construction at Washington, D. C. The tests were made at the U. S. Arsenal, Watertown, Mass., from samples of bricks supplied by the competing bidders of Washington, D. C., and the neighboring city of Baltimore, Md., by compression between cast-iron platforms after the faces of the samples had been ground flat.

Below is given the pressure required to crush the samples, for convenience being numbered from 1 to 12:

ULTIMATE STRENGTH.		
No.	Total pounds pressure.	Pressure per square inch.
1 Red brick.....	324,500	9,540
2 Arch brick.....	255,200	7,600
3 Pressed brick.....	231,000	6,470
4 Red brick.....	296,200	8,530
5 Arch brick.....	324,500	10,290
6 Pressed brick.....	314,700	9,190
7 Red brick.....	211,000	6,050
8 Red brick.....	209,300	6,930
9 Red brick.....	232,000	6,700
10 Arch brick.....	203,700	6,800
11 Pressed brick.....	210,000	5,960
12 Pressed brick.....	249,000	6,750

For ordinary building purposes there is not the least doubt but that any of the bricks in the above list are more than amply strong; that are intended to go down to the coming centuries there are some that it would not be good policy to use.

The contract was awarded for 9,000,000 common bricks and 600,000 pressed brick to the owners of samples Nos. 4, 5, and 6, which was the Washington Brick Machine Co. The following table will show the manner in which the brick that were submitted as samples for the above tests were produced and the class of clays of which they were made:

How produced, class of machines used in making, etc., etc.	Condition of clay when moulded.	Kind of clay.
No. 1. Hand-made	Tempered	Mixture of strong and weak.
" 2. Dry-clay machine	Dried	Strong.
" 3. Hand-made "glut" pressed in a hand press	Tempered	Mixture of strong and weak.
" 4. Damp-clay machine	Damp	Strong.
" 5. Damp-clay machine	"	"
" 6. Damp-clay machine -- repressed in a hand-press	Wet	"
" 7. Dry-clay machine	Dried	Weak and sandy
" 8. " "	"	" " "
" 9. " "	"	" " "
" 10. " "	"	" " "
" 11. Dry-clay machine -- repressed by a hand-press	Dampened	" " "
" 12. Same as sample No. 3		

In the above table where there is a mixture of clays the one first named is the predominating one. It is useless for me to give other tests that have been made either in this country or Europe, for no bricks have ever before made so good showing; but that is no reason why they should not. Advancement is necessary in the strength of bricks made for the New York and London markets, as there has been a great decline in this regard for some years past.

Clays that will make good hand-made bricks will always make equally as good stock, if not better when tempered into pug and moulded by machinery. When it is intended to mould the clay into bricks without being tempered, by what are termed dry-clay machines, great caution and discretion should be used both in selecting a machine and also in making the stock.

There is no such thing as dry clay for when all the water, mechanical and chemical, has been driven out of clay, by any means the substance is not clay but something else. The difference between dry-clay machines and damp-clay machines is that the first uses clay that has been dried by the sun or wind, and the other works it in its moist condition, as it comes from the bank.

The nearer clay approaches a plastic condition when moulded into bricks the better will be the stock produced, for when the clay is dried before being moulded it is impossible to produce a strong brick, the particles of clay will not agglutinate under pressure and in the kiln the heat, unless it be of sufficient intensity to melt the granulated particles of clay and cause them to fuse together, will pass through the brick, and not be so effective as in a damper and denser brick. It will require 25 per cent.

more fuel and longer time to burn the dried clay brick than the one made with damp clay. This is a fact that is well known to manufacturers of hand-made bricks, only in a different form. They are only too fully aware that bricks made in the summer, and carried unburned in the shed through the autumn and winter, will be much drier in the spring; but will require a greater quantity of fuel than if they had been burned within a few weeks after making.

For all machines that are intended to make bricks without tempering, the clay should be taken directly from the bank finely pulverized and fed to the moulds in as moist and natural a condition as it is possible to work it. All bricks made by this class of machines will have small cracks on the faces caused by the outer surfaces drying too quickly, and also from the air contained in the clay expanding during burning.

This is not a great drawback to the strength of the bricks for building purposes, unless the cracks are large and extend into the body. When it is intended to use bricks made by any of this class of machines for sewers, culverts, tunnels, wells, or other places where there is an unusual amount of dampness only those that have been thoroughly burned should be allowed, under any circumstances, to go into the work.

For aqueducts, reservoirs, pavements, and all of the above class of work, it is much better to use hard-burned hand-made, or tempered clay machine-made bricks when it is possible to obtain them.

All tempered clay bricks are denser or closer in the interior than on the outer surface, while bricks made from dry clays are just the reverse. In the latter process a slight moisture is developed on the surface under pressure which forms a smooth thin veneering on the faces of the brick, and when this wears away the remainder of the brick soon disintegrates under the influence of frost, dampness, acids and gases.

In selecting brick for building purposes, architects should investigate, to some extent, the methods and processes by which the bricks to be employed are produced. In the desire to get up a showy house—"something that will take, you know"—mistakes are too often made, and which are usually paid for by the loss of health and sometimes by the sacrifice of life. Is it difficult to call to mind houses that people call "unlucky places," in which an unusual number of persons die? These "unlucky places"

are for the most part nothing more or less than damp houses, resulting oftentimes from the employment of porous bricks in the construction of the walls. A pile of bricks now presents itself to my mind which were hacked about twelve feet high and placed on an elevation and covered with close, tight roof through which no water could get to them, but the brick commenced to get wet from the bottom which ascended gradually to the top of the pile, and finally every brick was as wet as if it had been laid in water and soaked.

Bricks absorbing more than eight ounces of water should not be allowed in the foundation or exposed walls of dwellings. A simple way to test the absorption is to weigh the brick and then place it in a bucket of water for five minutes or so; if on removal it weighs more than eight ounces over its first weight, discretion dictates its rejection for the two purposes named. This test applies only to hard-burned bricks, not to salmon stock.

Architects should be aware also of the acoustic effects which dampness of walls has upon public buildings by conducting, to a very great extent, to reverberation which confuses sound.

It is not uncommon for buildings to be hastily constructed and the internal coats of plastering put on one over the other in rapid succession and at once occupied for public purposes. But for many months they fail to give satisfaction to the extent that had been hoped from the pains that had been taken to make them acoustically good; although gradually, as the walls part with their dampness, acoustic defects disappear. It is of great importance that the bricks used in such walls be not so porous as to constantly absorb moisture, and for a long period, or permanently, retard the drying out of the walls or halls, for public speaking or for music. While they may be good in other respects, they may fail in this. In this matter architects owe a duty to themselves no less than to their clients and the public. It is not the province of this article to attempt an explanation of this phenomena which is a matter of common observation.

In newly completed buildings, a little drapery hung up for a few months may often retard reverberation and be a great aid; it can easily be removed when the moisture disappears from the walls and acoustic properties are assured. Since dry structures cannot be built with bricks that are absorbent, and as the ex-

tent to which bricks absorb water is so important, it is worth while to give attention to this subject.

**"He who builds a noble temple unto art,
And builds it solely from his head and heart
Hath done a sacred service."**

Civil engineers should also be careful in accepting bricks to be employed in certain classes of work. Bricks made by certain classes of machines have smooth exteriors but this smoothness is in many instances only a veneering caused by the forcing to the surface the dampness contained in the clay while under pressure in the mould of the brick machine. For instance, take the bricks made from clay formed in this manner and burned to the very hardest state and pave a section of the invert or bottom of a sewer through which pass quantities of sand or gravel and then pave an adjoining section with brick made by machines which thoroughly temper the clay and make a brick smooth and homogeneous throughout its body and which have been burned in the same kiln with the first-named bricks. What will be the result? The first section of the sewer bottom will, in a few months be completely cut out, and the second will stay for many years in almost as good condition as when first laid. Many large and costly works have been greatly injured through the employment of improperly made bricks for sewer inverts.

A case now comes to mind in which a large sewer 20 feet in diameter in Washington, D. C., was built from bricks formed from clay which had not been tempered and the bricks were completely cut out of the center of the invert and thereby let fall a section of more than seven hundred feet on length and causing the utter destruction of that much of the work.

The capacity of buildings of brick construction to resist earthquake shock is an important question in some portions of the United States. During the earthquakes in the vicinity of Charleston, S. C., and which occurred in Sept. 1886, more than one-half of the brick houses of that city had their top stories more or less demolished but the houses which escaped the loss of their roofs were in the worst condition, for nearly all of them were cracked a little in front and about on a line with the middle window of the middle story which shows they were all shaken from their foundations and loosened in every joist and joint. The city of Charlestown was founded some two centuries ago. Consequently

many of its brick structures were very old; built at a time when the ingredient used to give tenacity to mortar was lime. The weak, adhesive qualities of ordinary mortar could not resist such convulsions of nature as the earthquakes with which Charleston were visited and the walls of houses yielding to the force of the shocks gave way and crumbled.

The modern style of constructing brick buildings insures a large measure of safety. The mortar is compounded with cement which will hold even after the bricks have been broken. This is why with brick edifices three and four stories high, their occupants in San Francisco and other portions of the Pacific coast feel a security against earthquakes that would not otherwise be entertained. The shock must be violent which would wrench their walls or throw them down. During the earthquakes in Charlestown, S. C., and during slight shocks about the same time in California, the writer was an occupant of the Palace Hotel, in San Francisco, Cal., and even in that great hotel which is eight stories in height and of brick construction there were no signs of apprehension among the guests, although under the circumstances, fear might have been pardonable. In the reconstruction of Charlestown cement was freely used. No one in these days should put up a large brick building without the mortar being composed of at least one-third cement.

ORNAMENTAL BRICKS.

When a person builds a dwelling for his own use he makes an exact picture of his taste and exhibits the degree of his refinement and cultivation whether the structure be costly or not, the same as he does in his dress and personal appearance, for plain people build, dress and live plainly and as we have had a majority of this kind in the days gone by, we now possess their pictures in the plain, unassuming buildings which survive them. But that period is now rapidly passing away and attractive designs in architectural constructions are to be seen on all sides, in suburb and country as well as in towns and cities, and now we are in many instances combining elegance of appearance with solidity of construction.

It is not at all necessary to make a house expensive in order to make it attractive for some of the most costly structures are the least so. Pleasing ornamentations in burned clay can now be purchased so cheaply that a person who builds of brick without them generally

does so from lack of all desire for these embellishments of the exterior of his home.

The ornamental bricks now largely used are usually made from tempered clay and are moulded and pressed by hand, great care being observed to have the clay free from stones and small gravel and also in the handling, rubbing or sanding and drying of green bricks, for if the drying be done too rapidly they will have small cracks over their surface which are great objections in the eyes of buyers. In the kiln the bricks are carried along gently at first in the burning or firing in order not to "crush" or "squeeze" them, as they become soft while the steam or "water-smoke" is being driven off.

BLUE BRICKS.

Blue bricks is the name given to a material which for some purposes has no equal, being for some requirements much superior to the best quality of stone. In England and in many parts of the Netherlands, it is most highly esteemed for road and stable pavements, copings, channel courses and for solid walls, especially hydraulic constructions.

The bricks resemble cast-iron for hardness but are much superior to it for durability, being incapable of being eaten away by oxidizing. Clays which contain the greatest number of elements that are soluble in chlorhydric acid are the best for the production of these bricks and for terra-metallic ware in general. Natural clay containing oxide of iron in abundance and sometimes highly impregnated with lime and which is consequently much more fusible than ordinary brick clay is the material mostly used.

In Staffordshire, the clay used is a ferruginous material which is easily fused at a china-biscuit heat.

When natural materials properly combined are not possible to get, iron and lime in the shape of slag ground are usually mixed with fat clay, fine coke dust, and mill cinder, are used in England. Pugging as well as the moulding of this class of brick must be done by machinery. The most economical as well as effective kilns for the burning of this kind of bricks and for all classes of terra-metallic ware are those constructed on the annular system, as the firing is to a high vitrifying temperature and the cost of fuel is almost expensive item unless kilns on the continuous plan are employed. The blue color does not impregnate the whole body of the Staffordshire brick, as for terra-metallic ware, but penetrates

only to about one-eighth of an inch from the surface.

The color is obtained by continually submitting the stock or ware when at a high degree of heat to a reducing atmosphere of smoke, thereby converting the red peroxide of iron into protoxide; sulphur greatly assists the process. The salts of the protoxide of iron are all bluish and greenish. The same clay or material may be made to yield a red brick, a blue brick or glaze, which is dependent wholly upon the manner and degree of firing. The Cumberland and other soft coals commonly used in this country for burning ordinary building bricks will not answer for this purpose as they are too hard to manage, as the successive very heavy charges of fuel which are permitted to burn quite low.

The quality which our Cumberland and all soft coals have of swelling or largely increasing in bulk after being fired heavily, makes this class of fuel still more undesirable for this kind of burning and besides it is too quick and has too much flash. Wood and clean peat are the best agents for meeting the requirements of blue brick and terra-metallic ware burning. It is impossible to burn this class of pottery in rough, open kilns without excessive cost for fuel as well as loss on melted and salmon stock.

Written for the Clay-Worker.

HINTS ON BRICKMAKING.

No. 37.

BY "R. BRICK."

The question is often asked: "Which is the most economical plan to build a brick plant?" After the location has been determined then comes the question as to the best season of the year to begin operations. Early spring is certainly the proper time; this gives the whole season for natural drying. In speaking of a brick plant a permanent one is meant, that is, steam power, artificial dryers, and permanent kilns. First, select your machinery and engine and boiler, and order them. Then grade your yard with a fall of one foot in one hundred. Provide drains so that surface water will be carried away quickly. Order all lumber necessary to build a good engine room, machine building and tool house—these buildings should be made permanent from the outset. Begin making bricks as soon as there is no probability of frost destroying the bricks, and dry by sun heat and air. Provisions must be made to protect the product

so far as possible from rain. If some of the bricks are somewhat damaged by rain they can be burned and utilized in building your permanent walls as well as the temporary ones. The product of the first season must be burned in temporary walls. There will be a certain per cent. of arch brick damaged more or less and probably more salmon brick than can be sold, these can be set aside for building the permanent kilns, and dryers. Bricks cannot be burned in temporary walls or even permanent walls without more or less damage to the arch brick, unless the latter have furnaces attached to protect the brick from sudden shrinkage from drafts of cold air when firing. No man, however skillful, can prevent cold air from rushing in the fire hole when he is putting in fuel, this I think is plain to every practical burner as well as others. By setting aside the damaged and part of the salmon brick, you are enabled to give your patrons a good quality from the start, thus securing their custom. Salmon brick should always be protected from rains to save them. As soon as a sufficient quantity of brick has accumulated begin the building of clamps, and in the latter part of the season begin building artificial dryers of whatever kind you may choose, from among the many in use; by the time cold weather comes have the dryer ready for operation. During the fall and winter build as many additional clamps as may be needed, and by the time spring opens your plant is completed and ready to turn out good brick, with the full capacity of your works every day. This is not only the most economical way but enables one to put in a plant in this way with much less capital.

I have known men to buy brick to build their dryers and clamps, this I think an extravagant way to proceed. If the brick used are manufactured at the plant they get them at first cost, if they are bought they must pay cost with profit added.

Next to labor fuel is by far the most important item in brick manufacture, and this question should receive careful attention. Before the work of building the plant begins determine whether the fuel used will be coal, wood, oil or gas, and the cost of same delivered at the works; if it is coal, contract for the year's supply at the most favorable time; if wood is to be the fuel be sure to have a season's supply where it can be reached with certainty when wanted. Judgment should be exercised in purchasing wood,

good solid split wood is cheaper at \$3.00 per cord than is poles, soft or decayed wood at \$2.00 per cord. The same in a manner is true of coal, it is better to pay more and get clean, pure coal, for we must remember that there is no heating power in ashes and cinders, and impure coal requires more labor to fire with it, and more heat is wasted, as the furnaces require more frequent cleaning and this is always attended with a certain loss of heat. There is no doubt that the very best way to economize heat and fuel in burning is to hold the heat on the ware as hot as it will bear, and without intermission. This not only economizes heat but improves the quality of the ware burned.

HOW TO GET ON.

We have little sympathy with the spirit of the complaint that is abroad in the land, as to capital oppressing labor. That those who are employed are justified in the use of extreme measures in resisting the exactions of the employer. It is high time to talk plainly of the relations that exist between the two. The employer is entitled to the service for which he contracts. The employed is entitled to the compensation promised. The man or boy that agrees to work a given number of hours per day or to work the usual number of hours which the custom of the neighborhood has established, should render a faithful service. A faithful service implies not only a service of body but also of the mind. The employment of the mind as well as the body means not only to do what the body can do without too much fatigue, but to do it well. The service of some men is worth almost double that of others, for the reason that they study to do what they do well, both as to the character of the work done and the economy of time in doing it.

To illustrate more particularly: In the handling of clay at the bank, it is often desirable that the stratas be thoroughly mixed, the man that will give faithful attention to this feature of the work and at the same time expedite the labor of handling may save to his employer in the betterment of the character of the product turned out, several dollars per day, compared with a man who only handles the clay to draw his wages. Or in the handling of green brick one may so carefully and yet rapidly handle them so as to preserve the edges and corners to an extent that his services is of much more value than in the case of another

who takes no pains but rather mars and injures the appearance by rough and careless handling. The same is true to some extent in everything that is done about the yards.

The man who studies the interest of the employer renders the more valuable service.

The "don't care" or "if he don't like what I do I will quit" man, is only a time server. Invariably such men keep their eye on the "boss" and steal time when they can, or otherwise injure their employers, in petty ways it may be, but no less effectually. Such men breed disturbance among the men on the yards, complain of oppression, and in many ways annoy. There is little hope for the success of such men. They never get on to success in life. They don't care, they don't do, and won't do for the interest of others.

On the employer's side it is clearly to his interest not to overtax the strength of those whom he employs, encourage them to a faithful service, study their interests as well as his own, by giving them regular employment if he can, by saving them any extra labor or unnecessary delays, or other annoyances, and pay them the wages as agreed upon. And promptly discharge all disturbing elements as soon as their places can be filled with better men.

We have, however, a special interest in those among the employed who have a desire to make a commendable success of life. The men or boys who study the interests of their employers, who strive to do what they do, well. For such there is a promise of success. To such we say, continue in this well doing, husband your earnings, by laying them by for future use. Determine to have a business of your own at some future day. Make your services so valuable that your employer will prize them so highly that he will pay you the highest wages for the service done or advance you to positions of greater responsibility and better wages. The faithful man or boy will be found out and advanced sooner or later. Such service cannot be hid away for a great while. The keen business eye is looking out for such. There are thousands of men to-day who are proprietors of a large business, who at one time were off-bearers, receiving daily wages and low wages at that. They did well, biding their time until they were advanced. They were not lost. Such service is never lost.

We advise those who want to "get on in the world" that in addition to faith-

ful service, that of reading when they have a leisure moment, the experience of others, or the thoughts of others, will be a great help to "get on." Read publications devoted to the same line of business. Take such publications in your own name read them carefully, and mark all important suggestions and experiences, and file them away for future reference. It will be far better to do this than to read "dime novels," or to spend the time in telling filthy stories. Those who will follow these suggestions will "get on." There is a bow of promise to the man or boy who does faithful work, studies the interests of his employer and then when he has a leisure moment, turns aside to some quiet place and spends the time in storing his mind with knowledge for future use. There is no such thing as setting any reasonable bounds beyond which they may not go, in business life.

We have thought, and here we will drop the hint to the proprietor, that it would pay to select such men or boys in their employ, as they might think would appreciate the gift, pay for and send them a live publication devoted to the business. Have such publication mailed to them in their own names. Say to them; you have been faithful and there is a promise for you if you will make yourself intelligent in your business. Who can tell, but what very many in this way could be encouraged to attain distinguishing success in life. They will feel themselves called to a higher and better service for their employer—a service of mind as well as body.

It is well to make money in conducting a business; it is better to make more money by helping others up to an intelligent consideration of your and their interests. Withal, is it not one of the "hows to get on" both for the employer and the employed?

MY FRIENDS.

BY PROF.

Oh mud danber, tis of thee
Making things of utility
Of thee I'm proud.
Long may the craft unite,
Ceasing each others backs to bite,
And read the Clay-Worker now all right,
Making old fogies' shroud.

Clay banks where our fathers delved
Dry kilns where their brick they shelved,
Matlocks and picks all newly helved,
Good work to do.
To-day no longer need we swear
And curse and burn our hair,
As the fire comes out where
The smoke is blue.

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THESE COLUMNS ARE OPEN TO ALL. THE FULL NAME AND ADDRESS IS REQUIRED BUT WILL NOT BE PUBLISHED EXCEPT WHEN PERMISSION IS GIVEN BY CORRESPONDENT. THOSE DESIRING TO COMMUNICATE PRIVATELY WITH ANY CORRESPONDENT WHOSE FULL NAME IS NOT GIVEN CAN DO SO BY ADDRESSING LETTERS CARE OF CLAY-WORKER.

Philadelphia News.

Editor Clay-Worker:

So far this year, 4701 two-story houses have either been built or started in this city against 3222 up to same time last year. Of three-story dwellings 1463 have been started or built against 1080 last year. This makes 6185 two and three-story houses for the first six months against 4302 to same date last year. This beats all the years we have ever had. A great many are asking what will be done with all the houses. Permits are being taken out as though the demand were extremely urgent. Real estate is to be had at reasonable prices. Investors consider that house building is the best and safest investment that can be found. The investments range from 8 to 15 per cent. Taxes are \$1.85 on \$100. Our manufacturers are all prosperous. The textile interests are the most important, employing over 100,000 persons. It is this activity in the industries and prosperity of the wage-workers that makes it possible to build and sell so many houses. It will be remembered that an old millionaire, Isaih V. Williamson, who died a short time ago, left several of his millions for the establishment of a trade school. A board to spend this money was appointed and have not been able to agree upon the plans of the architects submitted. They have agreed to employ one architect and amend his plans to suit themselves.

Our brickmakers never had such a busy time before. Their contracts will keep their men busy at work as long as the weather permits. Preparations are being made to start three or four yards a little farther from the city. The brick makers will have a grand time when some of the schemes under consideration start. The Pennsylvania R. R. Co. will be a large buyer of brick to run up its additional buildings on Market Street. The Reading R. R. Co. expects to have its ordinance passed next fall to build its terminal line to 12th and Market Streets. Brick will be wanted by the millions then. There are two or three schemes on hand to build tunnel and elevated roads but these are bitterly opposed. Our belt line will go through all right; it is to be eighteen miles long. The people who live by investing their money

have just been paid over \$100,000,000 in Boston, New York and Philadelphia within the last three days. During the past six months there were 656 failures in this city against 585 for the first six months last year. The liabilities were \$5,000,000 as against \$4,000,000 last year. Our builders, architects, brickmakers, lumber manufacturers and dealers are all hoping that the good times we are having will continue. They would like to see a little more margin in business, but those good old days are gone forever. If we want to make money we must join the Sugar Trust.

The advance in labor-saving machinery for the making of brick has been greater for the past few years than all the improvements put together for the moulding of brick since the days when "David the primitive brickmaker made the children of Ammon pass through the kiln." Many of the machines are marvels of wonder turning out as they do, as much as 80,000 perfect bricks per day. A great number of machines have been patented in this country and in Europe, but it has been found exceedingly difficult to render them successful for the purposes for which they are intended and while there are continually patents being taken out for what it is termed "bearable plans," it is but fair to say that the perfect plan for moulding and turning out a complete brick in all its parts, has not yet been found.

Considerable comment is being made in reference to the action of the Government for purchasing 550,00 enameled bricks from English sources for use in the construction of the Congressional Library Building at Washington, D. C. It is said that Gen. Casey bought the bricks because they were the cheapest and best. He said that he had advertised extensively for bids for these bricks and that not a single American manufacturer had put in a proposal. He also claims that the Philadelphia brick were inferior in quality to those of English make. This is not the fact as we have the best foundation clay right here in Philadelphia, for the making of the best glazed or building brick.

The Excelsior Brick Company have the contract for supplying the Public Buildings in this city and the brick will compare with anything of the kind made in the known world.

As a matter of fact, Mother Earth has supplied this country with clays suitable for all building purposes equal to that of any other country on the globe

and American genius has supplied the brains for the building of brick machines that will turn out better work and more of it than England or all other countries combined. Then why should Gen. Casey go to England for brick? Eh? ANON.

The Village Brickyard.

Editor Clay-Worker:

Nearly thirty years ago the writer, raised in a country town, left school to learn an ideal business as a farmer and in doing so, took leave of one of the most bookish men in the state, who wrote me:

"If plough you will,
Be sure you plough your own furrows."

I went to live with an old man who owned a "model farm," one that had taken several premiums at the State and County Agricultural Fairs. The farm was high, rolling land from which we could overlook some seventy odd homesteads and I well remember being reminded, "Here, my boy, look out and see when the neighbors are plowing, planting or harvesting and don't let us be more than a day ahead or behind them in our work, for you may depend upon it their work is regulated by the combined average experience of the community, and if we follow them we shall not go far astray." Both of these admonitions my experience has repeatedly shown are applicable to every walk in life and to none more so than the business of making brick. Hence following out this plan, I will now turn another furrow, and not because I know all about the matter, but because I know a little and I want to chip in my little, in hopes some brother craftsman may hereby be encouraged to do better, so that, like my model farmer, we can read in the Clay-Worker an average of our experience and the steps leading thereto.

Some few years ago my attention was called to the subject of enamelling brick and the possibility of reaching a satisfactory result in our ordinary open-top Philadelphia kilns. I am aware this is one of the trade secrets like burning brick that the people who know do not and will not talk about, but then I am not in the business of selling recipes or instructions and, moreover, look very much sideways, sort of cross-eyed, at trade secrets, as I have found they are mostly claimed as proprietary by very small men or poor workmen who lack every essential for business success. One of my old masters, for a consideration, showed me the whole secret of dove-

tailed and fitting together on an old fashioned dough trough, and I shall never forget his look of surprise that I should be able to draw and calculate the whole thing from a sketch then recently published in a mechanical paper. And so it is in all such matters; every man who earnestly sets himself to solve the mysteries of a craft will eventually find out all the processes, and I take it, that a business like ours does not necessarily have any trade secrets and the more we can spread our methods among each other, the sooner we will qualify each other for better results.

Looking through various works on chemistry and sundry trade journals, a number of recipes were selected which the writers professed would glaze or enamel pottery. Then the wholesale chemist was approached and a bill of chemicals to meet the ingredients named procured at a cost of about \$4.00. Test pieces of clay of fine quality 1-in.x2-in.x 1½-in. were made and before burning engraved two or more with the same number and then fired in the center of the kiln, no sand being used on the outside of any of them (and by the way, this is a very convenient size for test pieces of various clays which every brick burner would do well to have a cabinet of for comparison.) My first trial was almost a complete failure. I ground and compounded my various recipes and brushed or painted my test pieces and having dried them set said pieces among the interstices of the brick about the middle of the kiln. After due time the kiln was burned off, the samples taken out and every one of them found coated with sand and ashes; half of them this foreign matter would brush off and underneath was my white glaze dried like whitewash and off it scaled at the slightest touch, but other samples the heat had been sufficient to make the ingredients soft and there was my glaze, sand and ashes all solid and fast to the surface of the test.

It was plain from this lesson that I might take hope but lacked a good deal from success. Casting about it was evident I needed a sagger to shut up my ware from this foreign matter. Not having such an article in the vicinity, I bought an old butter pot with a close fitting lid and taking only such recipes as had given me encouragement in the first effort I repeated the compounding, set my pot in the center of the kiln and in due course out it came, but unfortunately, I had leveled the inside of the pot

with fine sand. Unfortunately, the brick surrounding the pot shrunk in burning, throwing too much weight on the pot and cracking it open; unfortunately the pot had been glazed and everything in it was also glazed all over from absorption and the sand I had leveled with getting hot had been put in motion and settled over all my work. Still there was decided evidence that I was on the way, part of my work was fair and there was no want of sufficient heat.

Following this I secured an unglazed earthen vessel, again prepared my compound, brushed my samples and put them through the kiln. This time the work which would melt in our fire came out all right—several of the glazes desirable—and the door half open for other knowledge only waiting to be properly questioned. THE VILLAGE BRICKMAKER.

[To be continued.]

Brickmaking at Buffalo, New York.

Editor Clay-Worker:

Having but a few hours to spare, I thought of no better way of improving the time than to visit some of the brick yards here. When you have seen one of them you have seen all, so far as methods and manner of making brick and the kind of clay is concerned. And when you want to buy a thousand brick you go to the same office and buy of the same man, (Mr. Brush), no matter whose make of brick you want.

Most all the brick are made in the eastern part of the city on the Martin machines. The rack system is in universal use for drying. Most all the yards use permanent clamp walls for burning, with various furnace attachments. The old Bingham and Wingard being the most common.

The burns are good average burns as compared with other cities.

Most all the yards mix about one bushel of finely ground slack coal per thousand brick with the clay when it is put in the soak pit.

I saw no clay crushers in use. Each machine is provided with two soak pits, one on each side of a conveyor. Each pit holds enough for one day's run.

The clay is put into one pit today and used tomorrow. The ground coal is mixed with the clay as it is dumped in, by filling the pit, say with two feet of clay, leveling it, then a layer of fine coal, then two feet more clay, and so on.

The clay is carried to the machine by means of a conveyor made with two strands of wire rope connected about every four feet crossbars of iron bar scrapers. The lower part of the conveyor works in a flat bottom trough and drags the clay to the top of the machine. I think this one of the best conveyors I have ever seen for taking clay from a soak pit. It is cheap and durable.

One thing, however, at all the yards here I found the conveyor about two feet higher than the top of the clay in the pit, so that the man standing in the pit had to lift the clay at least shoulder high to get it into the conveyor. This

seemed to me very bad. I think the conveyors could be lowered between the pits, so that the shoveler could handle the clay with about one-half the labor.

I examined the crusher used for crushing the coal and found it to be a set of rolls about 18 inches in diameter and two feet long set under a large iron hopper. On the face of the rolls were V shaped projections, very wide at the top, and raised about one-eighth of an inch from the face of the rolls. These projections made the face of the roll rough and caused the coal to feed well.

Now, a word as to the Brickmakers' Association here in Buffalo. As remarked above, all the bricks are sold from the same office and by the same man, (Mr. Brush). I spent some two or three hours with Mr. Brush riding from yard to yard. And it was quite a novel thing, I assure you, to hear him giving orders at each yard as to the number and kind of brick, as well as the job to which they were to haul for the day.

A number of yards were ordered to haul to the same building while others were ordered to haul sewer brick, still others soft brick, and so on. The entire output of all the yards, save one, was controlled by one man through an executive committee.

I think this an excellent plan.

CORNING, N. Y.

The great calamity at Johnstown has attracted the attention of all so much that I do not suppose you readers care to hear of our small losses. The fact is, however, that our city has suffered severely. Many of our houses are washed away and even the land on which they stood.

The Corning Brick Works situated in the lower end of the city suffered severely. Their loss being not less than \$10,000.

They had just put in almost a new plant, consisting of the Penfield stiff mud machine, pug mills, crushers, etc., the Iron Clad Dryer, and were almost ready to begin a plant of the Eudaly down draft kilns. They have a good demand for brick, even more than they were able to supply before the destruction of their works.

In the course of a month they will be in running order and as soon as they get their new kilns will be able to furnish a very fine quality of front and ornamental bricks.

OBSERVER.

Reply to F. L. S.

Editor Clay-Worker:

A writer in June Clay Worker over the initials "F. L. S.," at Helena, Mont., refers to my article in your May No. and quotes me saying: "If clay will not stand sun drying, it will not, as a rule, stand sufficient heat in burning, to make a good brick." And then wants me to tell him, if I mean that such clay cannot be dried by steam or other heat in a "Dryer" without cracking. If "F. L. S." will notice, he will see that I said "cracking" might be prevented by sifting dry sand or dust over brick as they were laid

out on "yard floor," or, that if put on pallets under sheds, cracking would be prevented. If "F. L. S." will read my articles as they come out, he will see a good answer to his question. He says his clay does well in a room, and would like to know if it will do so in a "Dryer." The class of clay he alludes to, will crack anywhere in a dry, hot air, he will find the reason in my fourth article. But I will say here, that if "F. L. S." will fill a "Dryer" with his brick, made of soft mud, then turn in steam from the boiler, until the brick became hot as steam, then let the steam out, and no more in, but turn on dry air, or hot air not over 212° Fahr., his brick will quickly dry without cracking, and with careful burning will make a very good brick. Now if "F. L. S." cannot see the reason of this, (for I never say or do anything without a good reason), he will find it convincingly given in my seventh article, mean-while he can take my word, and go on with a "Dryer," as I have indicated, or he can mold his brick of "steam hot" mud, and dry them anywhere he may choose, if the heat is no hotter than the mud.

J. W. CRARY, SR.

That Election Hat.

Editor Clay-Worker:

I have been anxiously waiting to hear from our terra cotta brother, relative to the charges of "A. C. Member," (which I presume if properly translated means a charter member) in "Convention Brickdust, No. 3," page 236, April No., regarding that hat transaction at Memphis. I waited confidently, reliant and sure that he would promptly refute, explain or talk around the charge. but my waiting has been in vain and the charge remains unanswered. What can it mean? Was Pickett a prophet and has our brother sought the gate of St. Peter? Is he still there "busy with his smile?" Or has the hat of "Charter Member" dropped down over him as an extinguisher and snuffed him out? I do not know, and regarding whatever I do not know, I generally ask "Clay-Worker," and so I ask you now regarding his fate. I am sure something terrible has befallen him. His pure and lofty vocation had never seared his conscience so as to make him keep still under such a charge. No, something has happened. What is it and who is to blame? I must say that I consider "Charter Member" somewhat to blame in so recklessly putting temptation in the way of our young brother in the shape of that "Election Relic," that bandage, (so to speak) with which he had bound together the surging thoughts that burned and pulsed beneath it when he wore it. When "Charter Member" recklessly put this in the way of this young man what could be the result when he put it upon his artificially enlarged head? How it would start the tide of his thoughts in a flood of new schemes—"New Kilns," "Driers," "Machines," "Burning with Putty," and no end of strange schemes. This not for a day only but the poor man has to go through

this for a whole year, for you remember "Charter Member" has solved the heretofore unknown question of when our brother changed hats and in fact ruins the young man's chances at the next convention. I must censure "Charter Member" on one point, that is, on bringing sectional strife and the bitterness of politics into this matter. He says they were both election hats but dates his at the last election and dates our brother's back four years. This is a sad question. Such a wide difference is exposed by this statement that anyone is forced to expect some new expedient from the man who won a hat four years ago and it seems hard enough when our young brother had to adopt another method to have him exposed and carry the exposure "way back." I am glad to note one point, which impresses me favorably as to our young brother's integrity, and I note it gladly and triumphantly. I shall emphatically ask, on behalf of him who has disappeared, whether "Charter Member" had his card in his hat. I have noted through a long and eventful life that men who are accustomed to exchange back-number hats for late election trophies, do not as a rule, insert their cards in the relics they leave, and, in this respect, I think "Charter Member's" story is inconsistent and it brings me to fear (coupled with the young brother's disappearance), that the "election trophy" which "Charter Member" left, though young in years, was old and dizzy with experience, and has run its wearer no one knows where and into no one knows what.

FAIR PLAY.

The Chicago Affair.

Editor Clay-Worker:

In response to your request for information as to our so called strike I will first say that it is not a strike nor a lock-out, but so far as effect is concerned the result is the same.

The spring dress the wife expected will not come. The purchase of the carpet for the "best room" floor will be deferred. But these items are merely luxuries; with some it will be less flour, less meat, and with others it will be no flour and no meat. On whom does the brunt of it fall? The wife and children. To whom and to what will you attribute the cause? "Aye, there's the rub."

In 1886 the Chicago brickmakers compromised on eight hours work and nine hours pay. The country yards, namely, Purington-Kimbell Brick Co., Wahl Bros., and Adam Weckler, at Blue Island, May-Purington, at Dalton, Ill., on the C. & E. I. R. R., and Pullman Brick Co., at Pullman, were working satisfactorily under ten hours work and ten hours pay. The men were contented and at the Purington-Kimbell yard had entered into an agreement whereby they were to receive a certain sum per day from April 15th to October 15th and a lesser sum from October 15th to April 15th.

Points covering all anticipated causes for dissatisfaction were incorporated in the contract, revised by a committee of

the men, and the officers of the Company, signed by both parties to the agreement, and then ratified by *all* the men as a body.

This apparently was a solution of the strike problem. Could mortal man do more? The employer placing his employees in the same relative position as business men do each other when they are about to consummate a trade.

The advantages and disadvantages are discussed and agreed upon. The deal proceeds and each is desirous of carrying out the contract.

An unlooked for objector appears upon the scene. The city men hear of this Arcadia and they long to bring it under their power. They want nothing themselves. They work eight hours and have plenty of time for sleep and recreation. Then what is it they *do* want? Only one thing is apparent, and that is to keep the pot of "Labor" boiling. In doing this there is need for organization.

Organization needs officers and officers need pay.

When will men learn that under such circumstances as these, in obeying the behests of men who derive their living from "agitation" that they are but stokers in the hold of the ship, the propeller and the motive force—down under water, or in the hold working for dear life, "unhonored and unsung," while the officers are on the bridge, or deck, taking all the honors and getting all the pay.

A number of men from the city, accompanied by their leaders went to the yards above mentioned (with exception of Pullman) and forced the men to quit work.

With their wind pumps of brag, they are now forcing air down their throats instead of bread. The pay rolls show for a loss of \$600 per week to the manufacturers, the men lose \$6,000.

How long it will last on this basis can readily be surmised.

Already between 80 and 90 of Purington-Kimbell's men have returned to work of their own accord. The other yards agree to remain idle until the 5th of July.

The whole trouble arose on account of Mr. D. V. Purington refusing to allow a committee from the different assemblies of the Knights of Labor to dictate any terms, or interfere in any way between his employees and himself. He insists that any number of American citizens have the right and should be competent to arrange their own affairs, without the interference of outside parties, not excepting the chief officers of a labor organization. In fact a member of the striker's committee admitted that if all employers and employees sustained the same relation to each other as the P.-K. B. Co. and their men there would be no further need of their services.

The men did not want to go out, and have never expressed a grievance. Those who returned to work *asked* to be taken back and their relations are the same now as they were before the strike.

Mr. Purington insisted that all differences between his men and himself had

to be adjusted by parties concerned and assured his men, returning on the agreement, that they would be retained under all circumstances so long as they did their duty.

No man has ever been refused employment because he belonged to a labor organization at these yards and no man will be discharged should he refuse to join one.

From every indication the men at all the yards will be at work on Monday next and thus right will triumph over might, and all has been accomplished without bodily harm to a single man.

There is one inexplicable feature connected with the difficulty, and that is, the men who were working "piece work" were the "cat's paw" for the outsiders who wanted eight hours a day's work with ten hours pay.

SIC VITA.

Chicago, Ill., July 5th.

A New Departure.

Editor Clay-Worker:

While in River Falls, Wis., recently, I visited the works of the River Falls Brick Company and noticed a new departure in brickmaking which I think will be of interest to some of your readers. It is simply a dry house for the drying of clay in bulk. The clay is taken out of the clay bank which is filled with water and difficult to drain. The clay is loaded on the car and is run through the dry house of the Iron Clad Patent built by Messrs. I. & M. Wolff and Coleman, of Chicago. This dry house is 78 feet long by 22 feet wide and holds 42 dump cars of a special pattern. Each car holds sufficient clay for about 1,000 bricks and the clay is dried in twelve hours sufficiently to be worked in the Chambers Machine. During last winter the owners of this yard found it impossible to get their clay in shape for the machine and resorted to this means for preparing their clay. The dryer is simple and does the work very effectively and there are undoubtedly a number of your readers who may profit by an arrangement of this kind. The modification of this plant might be utilized for preparing the clay for dry pressed machines on a simpler and more economical basis than that usually resorted to by having clay drying sheds. I would suggest that parties interested in this matter correspond with the River Falls (Wis.) Brick Co. A PILGRIM.

PROGRESSIVE (?) BRICKMAKERS.

J. W. Henry, a brick manufacturer of Tipton, Ind., visited our state capital recently for the purpose of challenging the Indianapolis brickmakers to play a game of base ball with the Tipton brethren, the game to be played on Sunday and for any amount to be agreed upon. The clubs to be composed of men actually employed on a brick yard.

With characteristic enterprise we will send our "special representative" to edit the great event.

FIBROUS BRICKS.

A New Composition of Matter.

United States Letters Patent was granted on June 11th to Charles Carroll Gilman for "Fibrous Bricks" and their making.

This invention is the fifth and latest of his family of "Porous Earthenwares" and affords an improvement over the others which is likely to elevate the art to a work of *Joinery* as well as of Masonry and Carpentry, which it now enjoys.

The difference is the mode of its manufacture, from that of the fire-proofing and building compositions, which precede it in the order of invention, lies in the distribution of Asbestos Wool (not to be confounded with mineral wool), in fixed quantities throughout the mixture of combined earthy and vegetable ingredients, before going to the press.

By reason of the friction engendered in passing through the die, which shapes the plastic compositions, the Asbestos fibre becomes straightened into lines running lengthwise of the blocks, and remains in this strained form during the drying and burning processes which follow. Being indestructible by heat or fire it continues also as a fibre in the burned wares affording a strength to resist tension, not possessed by them without something added, on the principle exhibited in the admixture of hair in lime mortars, and allowing an application in architecture not before dreamed of, as for instance the construction of base-boards, doors and window frames, mouldings, and even doors and shutters, for the wares can be worked with edged tools, subsequent to firing, with the same facility as wood.

The first of Gilman's Fire-proofing Compositions, it may be remembered, was his invention in 1881, commercially known since that time as "Terra Cotta Lumber," a trade mark, which has given the art, founded upon that beginning, a world wide celebrity by stamping itself into the corporate name of manufacturers from Maine to Oregon, and across the seas even to far off Australia.

This first invention consisted of kaolinic clays and resinous sawdust mixed with water and ground together in such proportions and to such a degree of homogeneity as to permit the bricken product after pressing, drying and burning, to be shaped with the same tools used in carpentry, so evenly porous or cellular had the product become, by the skillful incorporation of the perishable

matters with the clay when plastic and the utter elimination of the sawdust by finally firing in kilns, as bricks are fired.

The practical manufacture upon a large scale, and the introduction of the Fire-proofing upon the market, showed conclusively, however, that owing to the infrequency of fire-clay deposits, and the consequent expensive transportation of the raw material, or burned products, such improvements in the manufacture would have to be made, as would permit the substitution of common or surface clays, in the place of the scarcer and fictile varieties, before the wares could become a staple to the world at large.

Labored experiments in this direction finally developed several new discoveries, which have since proven of even greater value than the one above described, and each of which was successively patented by Mr. Gilman both in this country and the older clay working countries of Europe.

Mixtures of earthy and vegetable matters were so treated that the wares could be burned without other fuel than that supplied by the atmosphere and the combustible ingredients contained in the

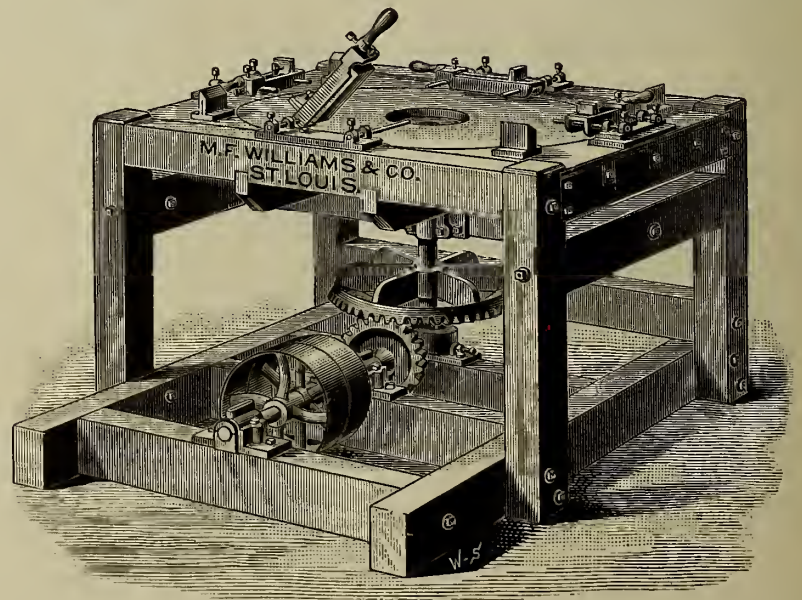
the same time, the cost of plants was reduced from \$30,000 to \$12,500.

This great reduction of cost, both of plant and product converted a material originally used solely for fire-proofing purposes, into a building material for general use, while at the same time retaining all of the fire-proof qualities of the first invention, so that for cheap cottages, stores and outhouses it is fairly competing with brick and pine lumber over which it possesses such inestimable advantages.

These facts should awaken the attention of our drain tile manufacturers, who are suffering from competition and consequent overproduction.

We are advised that a pony plant of 20 tons daily capacity can be supplied to tilemakers, who have a motive power of 40 horses or even less, at a cost inside of one thousand dollars.

Why not make your lumber at home, a fire-proof lumber at that, and build farmer's houses and barns instead of waiting for them to tile their wet grounds? is a question which may well concern the class of manufacturers of whom we have here made mention.



WILLIAMS' SIZING MACHINE,

For Press Brickmakers.

compound, and, too, in so short a time in some instances as twelve hours.

Safe drying processes were invented of less than twenty-four hours duration, and permitted the production of wares as long as ten feet, of proportionate dimensions in other directions without warping or cracking.

The weight of the burned product was cut down from sixty-five pounds to the cubic foot to forty, and its cost from seven dollars per ton and upward to three or three and a half dollar, while at

The above cut represents WILLIAMS' SIZING MACHINE for shaping Brick that cannot be shaped upon the Dry Press, such as ARCH BRICK, TRIANGULAR BRICK, and Brick for OBTUSE and ACUTE ANGLES. This Machine is operated by 4 boys; the grinding medium being sand and water, which is fed onto the wheel through a sluice-box not shown. The clamps will accommo-

date any shape desired. The bottom of clamp being hinged, and is adjustable to any shape, putting in and taking out of the brick requires but a moment—only one thumb-screw to operate. The clamps, guides and rests are all adjustable and very simple and durable. The upright shaft is adjusted by the tallow pot below, which keeps the wheels always in tram. The wheels are made thick enough to admit of refacing at least six to ten times, which should be done every season in order to insure even work.

For prices and further information, inquire of the sole Manufacturers,

MILTON F. WILLIAMS & Co.,
1417 & 1419 N. Second St., St. Louis, Mo.

STOP IN YOUR MAD HASTE FOR WEALTH AND READ ABOUT THE EIGHTH GREAT WONDER OF THE WORLD.

Since the cessation of political strife, industry and trade have taken prodigious strides ne'er known before. America has assumed the foremost position among the nations of the Earth and Kings do her reverence. What has caused this extraordinary change in material things? The Sages and Wise Men of Oriental History move in their sepulchres and the answer comes rolling back to us on the sands of time. It is thus:

"This great revolution in America's growth arose from the introduction of two new sizes of the OHIO BRICK AND TILE MACHINES."

It is not strange that the minds of the people turn with glad relief from the contemplation of political issues to behold the wonders of these mighty Machines which grapple with the Earth while towering buildings and fertile fields mark their appearance.

All are deeply impressed with the unprecedented popularity which the Ohio Machines have commanded and the distended orbs of the Populace of this great, glorious and enfranchised country are turned in astonishment to behold the miraculous feats which these machines are capable of performing in the production of brick and tile. The unparalleled strength and durability of the A and B Machines enforce the respect of their most bitter competitors who recognize the fact that they must hopelessly seek a more congenial clime and more distant worlds to conquer—leaving to the "Ohio" the enviable reputation so justly merited.

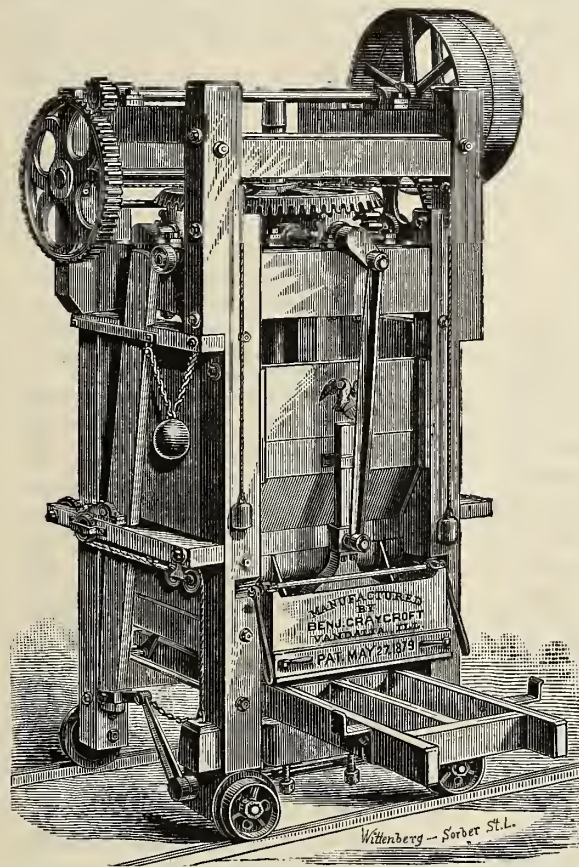
Do not fail to make sure of your future prosperity by immediately purchasing

one of the Ohio Machines which are being sold in large numbers.

It will result to your advantage to write FATE & FREESE, Plymouth, Ohio, for their illustrated catalogue of 1889. Their new "ad" appears on page 43 of this journal.

EAGLE BRICK MACHINE.

The attention of all parties interested in the manufacture of brick is invited to the improved Eagle Brick Machine as shown in the accompanying cut. It is simple in construction and any man of ordinary intelligence can operate and control it. The machine throughout is



built for strength and durability and is so constructed that it is impossible for it to crush or break the moulds and a stick or stone will throw the machine out of gear and it will resume work as soon as the obstacle has been removed, which can be done in a moment by the operator, the press-box being so constructed that it readily glides upward or downward by the use of a lever. It grinds and mixes the clay thoroughly and the clay is pushed into the press-box by a plunger the plunger forming a back wall to the press-box so that when the press-foot comes in contact with the clay it presses it directly into the moulds thereby insuring full moulds and bricks with well

defined corners and edges and nearer perfect than can be made by hand. The machine by its own action delivers the bricks on the carriage in front of the workmen.

This machine excels all others in lightness of draft and speed—one ordinary team being required to operate it. It makes six bricks at a time and twenty-four at each revolution of the machine. Six men and three boys is the usual force required to operate the machine. The horsepower machine will make from twenty-five to thirty-five thousand bricks per day and steam gearing is so constructed that it can be belted on from any ordinary engine without the extra expense of a countershaft.

The number of bricks that can be made in a day depends upon the amount of work the gang can do. The machine will make good, nice brick as fast as any gang of men can operate it. Observation has taught that the only way to make good brick such as will dry without cracking and burn well and stand the climate, is to soak the clay from ten to fifteen hours in pits so that when it is ground by the machine all the particles will be thoroughly united and cemented together.

Brick made in this way shrink less in drying and burning than brick made by hand. When brick are dried upon the yard, three off-bearing trucks and twenty moulds are required to each machine. When pallets are used, which is regarded as much the best

system, twelve moulds and three trucks are sufficient.

The moulds are made of selected cherry or walnut, well seasoned, accurately put together, strongly iron bound, and of any size required. The off-bearing trucks are made with two springs each and are strong and durable. The machine is sold upon its merits and guaranteed to do good work. For further particulars address the manufacturer, Mr. Benj. Craycroft, Vandalia, Ills.

Russia has placed a tax of one kopeck each on every egg sold in the kingdom, and the hens kopecking around with every mark of dissatisfaction.—*Epoch*.



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T. A. RANDALL & CO.,
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WHAT WE WANT.

It has been our purpose from the beginning of the publication of the Clay-Worker to make it a means of helping others, by encouraging men of experience to write for its columns. We are always pleased to receive communications that are brimfull of observing, practical experience. Theory is all well enough if it is suggestive of progress, but theories that are backed up by experience are better. Theories, however, that are long drawn out—very fine, hair splitting, technical, and nothing more, are like the valley of Ezekiel's vision—of which the prophet said, "the bones are many, but very dry." And they are so "dry" that the plain every-day matter of fact man, with plenty to do, don't read them. And such communications we are compelled to return to the writers, or consign them to the capacious maw of the waste basket. Life is too short to waste in the reading of them.

We have been especially favored with an abundance of plain, practical, well digested, every-day experience, dished up in most part in a brief way, and our readers appreciate them.

We do not expect that business men will take the time to select the best literary phrases to express their thoughts but prefer them to dash them off in plain every-day speech. Our readers will understand them, and if there are no classic phrases in other tongues, it saves us the trouble of employing some learned professor to interpret them.

What we want is, gold nuggets of prac-

tical thought and experience. The gold may be in the lump and a little rough, if so, we will hammer it out a little and make it a blessing to others. Deliver us and our readers from having to wash a ton of earth to get a little shining sand.

VERDANCY OR CHEEK.

Occasionally we receive a communication, in which the writer evidently intends to bring before the public some invention or device not otherwise advertised. Such people seem to think that the subject is a matter of so much importance that we are under obligation to lay it before the public instantly and without cost to them more than the two-cent stamp, a sheet of paper and envelope. They doubtless conclude that we are running this institution for the amusement there is in it. The gratuitous advertising expected in this way is intended to benefit the writer of the communication, we understand that, the effect intended is to put money in their pocket, but alas—

"The best laid plans of mice and men
Ait gang aglee"—we don't print 'em.

THE AGITATORS EVIL WORK.

As we go to press we learn that the Chicago out-of-town yards have partially resumed operations, about half to two-thirds of the men returning to work under the old agreement with which they were entirely satisfied. Idle men and labor agitators (so called we presume because they agitate that they may not labor) from the city are trying to frighten the men who have returned to work by threats of violence but the employers have taken every precaution possible to protect their men and property, have employed deputy sheriffs to prevent trouble from the lawless element and anticipate no further serious trouble. They think the yards will soon be running full handed again and on the same terms as before.

This it seems is a remarkable instance of workmen being led by labor agitators to abandon their work and suffer the loss of thousands of dollars in wages in order to gratify the vain ambition of these self appointed selfish leaders—God save the mark. How long will intelligent American laborers submit to such unjust interference with their rights and duties, simply because it comes under the guise of labor organization? is a question we have hardly the patience to consider from the fact that the existence of such a condition is a reflection upon the good sense and manhood of our working men. As

"Sic Vita," who is an entirely disinterested observer, tells in his letter in this issue, the men engaged were perfectly contented, there was no grievance whatever on their part yet, at the beck and call of these pestiferous labor agitators, most of whom have more brass than brains, are innocent of any labor and do not know the real meaning of honest toil, but leech a worthless existence from their blind followers, they give up their work entailing a loss to their employers of \$600 a week and ten times that amount to themselves. It is an exhibition of the evil of bad leadership that working men should ponder well for, in almost every instance, the resulting loss and injury falls heaviest upon themselves and families, not on their employers.

THE USE OF HARD BRICK FOR STREET PAVING.

The very general attention directed to the use of hard brick for paving streets is unprecedented in street improvement. The towns and cities that have tested the use of "brick pavers" in the past few years have so fully established their merit that even the most skeptical, who have taken the pains to inform themselves upon the subject are quite ready to acknowledge their adaptability for this use.

There are, however, a few practical points worthy of consideration, of which we wish to treat briefly. The first is the character of the brick used. The importance of good material should never be overlooked in any kind of pavement. A block pavement should have sound blocks, or a stone pavement should have a uniform hardness and suitable dimensions, and the best of paving only should be used.

The best pavers do not depend wholly upon the hardness. A brick may be hard, and brittle—so brittle as to be unfit for use in paving a street.

A good paver is both hard and tenacious, that is, not easily broken—adhesive. This very desirable quality is not altogether the result of the method of manufacture, but is owing largely to the character of the material of which the brick are made. Method has something to do with the character of the paver, and the material more.

It is essential that the pavers should be made of the right kind of clay. Such clays are abundant, but all clays are not suited to this use. A good clay burned until the brick are partially vitrified at least is requisite for street pavers.

It is essential that they should be alike hard and tenacious. No material of a doubtful character should be allowed to enter into their construction. It is agreed, however, that the bottom layer need not be so flinty hard as the top layer, the latter being exposed to the wear of travel should be A No. 1 paver.

The character of the material being satisfactory, the next point of importance is the road bed, which should be brought to the required grade, and if inclined to be soft or springy in places should be underdrained with tile drains. A single line of tile in the center at a depth of three or four feet below the grade may be sufficient. There are springy clays that require two lines of drains, one on each side of the road bed, a few feet from the curbstone, as the width of the street and the character of the road bed may require to secure the best drainage.

The street may or may not be raised in the centre three or four inches. The grade should be made uniformly solid.

The grade complete, then cover with sand a depth of five or six inches, then lay the brick flat from curb to curb, breaking joints as in masonry, tamp the brick solidly and level, cover with two or three inches of sand and place the top layer of brick on edge as close as they can be set, breaking joints as before—setting from curb to curb and tamp well; cover with sand a depth of two inches.

The travel will settle the sand into the openings so completely that the street surface will be practically water tight in a short time, if subjected to much travel.

When complete the brick paved street is one of the best for general travel—very durable. Streets that have been in use eight, ten or fifteen years give promise of lasting probably a quarter of a century longer with little repair.

The cost is easily figured. The grading, the sand, the number of brick per square yard for the first and second layers, the cost of brick delivered, the labor of laying, etc., are all easily computed.

It is true that streets so nearly level need not be so wide, which will leave room for a grass plat on each side between the sidewalk and travelled way which is very desirable in resident portions of towns and cities.

The space commonly allotted to gutters of five or six feet in width is repulsive to the sight, and withal expensive and inconvenient, and ought to have no place in a brick paved street. A street so nearly level and smooth will be travelled from curb to curb.

PRIZES FOR BRICK AND OTHER CLAY PRODUCTS.

The success of the Pottery and Porcelain Exhibition was so great last year, that the managers of the Pennsylvania Museum and School of Industrial Art have decided to follow it this Autumn with another Exposition, on a more extensive scale, and which promises to surpass it in size, variety and character.

Memorial Hall, in Fairmount Park, Philadelphia, has been selected as the place for holding the Exhibition, which is to be called the Exhibition of American Art Industry, and which is to open October 7th and continue until November 18th. The display is to be open this year to terra cotta, tiles, glassware, stained glass and mosaic work, as well as to pottery and porcelain.

Held in accordance with the terms of Joseph E. Temple Trust, and endorsed by the State of Pennsylvania, it is intended that the Exposition shall illustrate the present condition of the art industries in America. In order to stimulate an interest in the matter prizes are offered for superior work in the various departments and up to a late date about one hundred and twenty-five exhibitors have signified their intention of entering the competition.

Subjoined is a complete schedule of the prizes announced to be awarded in the leading departments.

MOSAIC SECTION:

Class No. 1, Floor Mosaic: 1st, \$50; 2d, \$35; 3d, \$20.

Class No. 2, Wall Mosaic: 1st, \$50; 2d, \$35; 3d, \$20.

Class No. 3, All Mosaic Work not included in the above: 1st, \$50; 2d, \$35; 3d, \$20.

Class No. 4, General Exhibit: 1st, gold medal; 2d, silver medal; 3d, bronze medal.

Class No. 5, Designs for Mosaic Work: 1st, \$50; 2d, \$35; 3d, \$20.

All are open to residents of the United States. In all classes except No. 4 persons winning prizes may have medals in place of the money.

TILE SECTION:

Class No. 1, Embossed Tiles, Enamelled: 1st, silver medal; 2d, bronze medal; 3d, diploma.

Class No. 2, Plain Tiles, Enamelled: 1st, silver medal; 2d, bronze medal; 3d, diploma.

Class No. 3, Plain Tiles, glazed or unglazed: 1st, silver medal; 2d, bronze medal; 3d, diploma.

Class No. 4, Encaustic Tiles: 1st, silver medal; 2d, bronze medal; 3d, diploma.

Class No. 5, Picture Tiles, in relief: 1st, silver medal; 2d, bronze medal; 3d, diploma.

Class No. 6, Hand Painted Tiles: 1st, bronze medal; 2d, diploma; 3d, \$15; 4th, \$10.

Class No. 7, Tile Modeling: 1st, silver medal; 2d, bronze medal; 3d, \$20; 4th, \$10.

Class No. 8, General Exhibit of Tiles: 1st, gold medal; 2d, silver medal; 3d, bronze medal; 4th, diploma.

All classes except Nos. 5, 6 and 7 are open to American manufacturers only; the others to all residents of the U. S. In the former classes persons winning the first three prizes may have medals instead.

TERRA COTTA SECTION:

Class No. 1, Vase, Capital, etc., in Terra Cotta: 1st, silver medal; 2d, bronze medal; 3d, \$20.

Class No. 2, Panel, etc., in Terra Cotta: 1st, silver medal; 2d, bronze medal; 3d, \$20.

Class No. 3, General Exhibit of Ornamental Terra Cotta: 1st, gold medal; 2d, silver medal; 3d, bronze medal; 4th, diploma.

Class No. 4, General Exhibit of Ornamental Bricks.—For the best general exhibit of ornamental bricks, enamelled or plain material, color, design and workmanship, considered: 1st, silver medal; 2d, bronze medal; 3d, diploma.

The last two classes are only open to American manufacturers and the others to all residents of the U. S. Winners of the first two prizes in classes No. 1 and 2 may receive \$50 or \$35 in place of the medals.

NEW INVENTIONS.

The following is a list of patents appertaining to brick, tile, terra cotta, sewer pipe, pottery, etc., and the machinery used in their manufacture issued since our last number: (A copy of any of them can be obtained by sending 25 cents, the official price, to Chas. E. Brock, Patent Attorney, 925 F St., Washington, D. C.)

402,628. Brick Kiln—R. Stanley, Nines-ton, Warwick Co., England.

402,940. Die for Brick Machine—A. Rundsen, Sycamore, Ill.

402,662. Brickmaking Device—Morgan & Baird, Burlingame, Kan.

402,897. Paving Block—J. L. Breed, Syracuse, N. Y.

402,930. Illuminating Tile—J. Jacobs, New York, N. Y.

403,235. Brick Machine—W. Weeber, Philadelphia, Pa.

403,276. Device for Handling Green Tile—J. W. Laughlin, Parkville, Ill.

403,646. Brick and Tile Cutting Machine—E. M. Burr, Champaign, Ill.

403,837. Roofing Tile—Gunsten & Braem, Denver, Col.

404,198. Brick Kiln—Z. Joehum, Ottweiler, Prussia, Ger.

405,066. Burning Brick—J. C. Anderson, Highland Park, Ill.

404,857. Brick Machine—B. Owen, Dayton, Ohio.

405,183, 405,184, 405,185, 405,186. Tile Machine—W. D. Sherman, Omaha, Neb.

405,631. Brick or Tile Cut-off Machine—W. Wallace, Willoughby, O.

405,281. Pulverizer—F. Taggart, Brooklyn, N. Y.

405,642. Mold for Making Sewers—J. Boade, Waco, Tex.

EDITORIAL NOTES and CLIPPINGS.

J. R. Martin will start a brick yard at Denison, Tex.

J. R. Goodwin has started a brick yard near Greenville, S. C.

It is proposed to start a brick and tile factory at Benton, Ark.

V. B. Batchellor is building a brick yard at Nashville, N. C.

Wells & Mays have erected a brick yard at Greenwood, S. C.

M. H. Donnelly is going to build brick works near New Britain, Conn.

The Star Brick Co. has been organized and is starting a yard near Lancaster, N.Y.

The Kiesel Fire Brick Co. intend building a \$30,000 plant near Farmington, N. H.

The Harker Pottery Co., of East Liverpool, O., has been incorporated. Capital stock \$100,000.

It is claimed that there is a very large deposit of fine fire clay at Oak Park, near Ft. Smith, Ark.

Geo. Maddux's pottery at Sacramento, Cal., was burned recently. Loss \$5,000. Insurance \$1,000.

P. F. Welch has bought the brick yard of Dr. O'Brien and John Cahill, at Turner's Falls, Mass.

The kiln sheds at Linley, Wright & Co.'s yard near East Brookfield, Mass., were burned recently.

The kiln sheds on the yard of Doyle & Callahan, Utica, N. Y., were burned the first inst. Loss \$1,000.

The Cumberland Fire Brick Co. has been organized and will establish works near Middlesborough, Ky.

The Coosa Sewer Pipe Manufacturing Co. has been organized and will build works at Gadsden, Ala., to cost \$40,000.

For bargains in machinery, property, desirable situations, or experienced help, read the "For Sale, Wanted, Etc." columns.

James Stockman, of Elk Point, Dak., lost 35,000 green brick during a storm one night recently. Moral: Build a modern yard.

The Wayne Brick & Tile Co., Olympia, Wash., has been organized with \$50,000 capital. They intend to make brick, tile and sewer pipe.

The Washington Tile & Stone Co., Tacoma, Wash., has been incorporated, R. J. Carson, G. D. Hamor and T. W. Wampler, directors.

Drewery Bros. have sold their brick yard at Choccolocco, Ala., to J. T. White, of Easton, Md., who reports the outlook good for a lively business.

The Hampshire Pressed Brick Co., of Hampshire, Ill., report that the Raymond Clay Pulverizer furnished them by Chas. Kaestner & Co., Chicago, Ill., is a complete success in every particular.

The Peerless Brick Co., of Otto, Ills., after a thorough investigation of all the dry pressed brick machines in the market, have placed an order with Charles Kaestner & Co., of Chicago, Ills., for two

of the Brewis Improved Presses, two Raymond Clay Pulverizers, and 100 horse power Engine, two 60 inches by 16 feet Steel Boilers together with all the machinery to be used in their plant.

We call special attention to the change of address of the Simpson Brick Press Co. who have removed from Minneapolis to Chicago, Ill.—see ad. on page 7—in order to more readily keep pace with the increasing demand for their machinery.

J. J. Williams writes that he intends to enter the brick business at Greenville, Texas, the coming season. He is partial to the stiff mud process and desires information as to the best means of handling brick from machine to dry sheds and kilns.

Jno. Mahaffe, now residing in Mississippi, but formerly a Hoosier, writes that there are fine openings for the establishment of brick and tile factories in that section. There is plenty of clay of excellent quality and a rapidly growing demand for both brick and tile.

In renewing his subscription, John Burnett, of Lake Charles, La., writes: "We are making brick and tile, using the Ohio Brick and Tile Mill with which we are much pleased. We find the Clay-Worker a great help and would not be without it for many times its cost."

Jno. M. Griffith, of Los Angeles, Cal., has ordered 40,000 pressed brick shipped to him from Baltimore, Md. Mr. Griffith, who formerly resided in Baltimore, is building himself a residence in his new home and will have none other than Baltimore brick for the exterior work.

We introduce to the trade on another page a new and sprightly candidate for trade favors—The "New Haven" Horizontal Steam Power Brick Machine, manufactured by the McLagon Foundry Co., New Haven, Conn., who will be pleased to correspond with those desiring information as to the special merits of their machinery.

The Lookout Clay Pipe Works, of Chattanooga, Tenn., has been organized with paid up capital of \$80,000. The officers of the company are: T. G. Bennett, Jackson, Mich., president; John G. Rawlings, Chattanooga, vice-president; M. A. Woodburn, secretary and treasurer; John S. Smith, of Jackson, Michigan, superintendent.

The brick interests of Seattle, Wash., are just now in a most flourishing condition. Since the great fire the price has advanced to \$10 a thousand on the yard and the demand will doubtless exceed the supply through the building season. There are now twenty yards in Seattle and vicinity with a combined capacity of 500,000 a day.

The Berlin (Conn.) Brick Co. recently made 66,173 first class pallet brick with their regular gang of men in thirteen and a half hours actual running time with one "New Haven" machine, out of which appears on page 36. That speaks well for both the men and the machine. The machine runs at the rate of 13½ molds a minute and certainly did not

give the men much trouble. They think it is a good run and if anyone can beat it, they will try to do better still. Next!

We have recently received and placed in the cabinet in our sanctum a few sample bricks made by the Tiffany Pressed Brick Co., of 161 La Salle St., Chicago. The brick are indeed very fine, we have never seen any better. The ornamental brick are beautiful in design, well nigh perfect in execution, while the surface, edges, color and texture, are all that can be desired. They are justly admired by all who see them and fill completely the requirements of the most exacting architect or builder.

We expected to give a sketch and description of the Central Press Brick Co.'s new works at North Baltimore, O., in this issue, but the engraver has disappointed us. This plant has been erected and is now in operation under the supervision of Mr. W. D. Richardson, one of our well-known contributors, and is thought to be a model dry press brick factory. They are using the Simpson presses, and burn with natural gas in Eudaly's patent kilns and are turning out an excellent grade of pressed and ornamental brick.

With the next (August) issue of the Clay-Worker we will begin the publication of a series of papers on the subject of "*Sewer Pipes and Their Manufacture*," from the able pen of Mr. Alfred Crossley. Though an extensive and very important industry the manufacture of sewer pipes has never before been discussed carefully in a practical manner, it remaining for the Clay-Worker to give to the craft the first practical and valuable treatise on the subject as we have done before in other branches of clay work. We also have on hand several interesting communications on other topics, which came too late for this number but will bear keeping, and enables us to safely promise that the August Clay-Worker will be a most interesting issue.

NEW ADVERTISEMENTS.

- Fate & Freese,
Brick and Tile Machinery.
- C. & A. Potts & Co.,
Clay-working Machinery.
- Jonathan Creager's Sons,
Brickmaking Machinery.
- Michigan Brick & Tile Machine Co.,
Brick and Tile Machinery.
- J. W. Penfield & Son,
Upright Stock Brick Machine.
- I. & M. Wolff & Coleman,
Artificial Dryers.
- The McLagon Foundry Co.,
Brick Machinery.
- International Terra-Cotta Lumber Co.,
Porous Earthenwares.
- Cincinnati Corrugating Co.,
Iron Roofing, Etc.
- Link Belt Machinery Co.,
Clay Conveyors and Elevators.
- M. F. Williams & Co.,
Brick Shaping Machine.
- Small Ads., For Sale, Wanted, Etc.

UNCLE DAVID'S "JEREMEDIDLER."

"He is a 'Jeremedidler,'" Uncle David said.

"A what?"

"A 'Jeremedidler.'"

"Well explain, please, what you mean by that term. We are in the dark," we replied.

Uncle David replied: "I mean that Jacob is a representative man of his kind; a class of men that we can hardly dismiss from our service, and still they are not profitable to keep. Jacob has worked on this yard for three years, he has a large family dependent upon his labor. I feel sorry for the family and for him, and so I let him stay and pay him the regular wages. But he is not a driving man, in fact, he is otherwise. Everything I set him at he finds some way most naturally to piddle at it, not intentionally, perhaps, but the result is much the same. He is always trying some new way of doing things, with the intention apparently of expediting his work, but his little devices and changes all come to naught. Jacob is always on hand and ever full of expedients, if you let him try them, but some way or other he gets hold of the wrong end of things and still he is seemingly anxious to render efficient service, and manifests an interest in the work, but he don't 'get there,' as the boys say, for the reason that his efforts are not well directed. And it is so with him in everything he undertakes to do. I like him for his quiet unobtrusive ways, he seems devoted to my interests and is never heard to complain—never conspires with others to work me for more pay or less working hours, and has been known to oppose any and all movements of the kind. He is honest and as regularly on time as any man on the yard, but I can't get the work out of him that I can out of the others because of his wrong ended ways, so I just call him a 'Jeremedidler' and let him stay. I conclude that for the good of his family and what he really intends in the way of service make it expedient for me to let him remain, while at the same time he is a 'Jeremedidler,' and that is all we can say of him."

We pondered Uncle David's rather practical way of reading the man and after all we looked along the line of our observations and here and there we could see the 'Jeremedidlers' among the employed and the employers. There are many of Uncle David's 'Jeremedidlers,' who, some how or other, get hold of the "piddling" end of everything they undertake to do.

METHOD OF MANUFACTURING BRICK
Patented to J. F. Clark, May 15, 1888.

Claim—An improvement in the art of making brick, which consists in cutting the brick from a column of clay as it emerges from the machine, in a Curved Direction, so as to form one side Convex and the other Concave, and then straightening the sides of the brick by subsequently drying and burning the same, as set forth.

We are daily in receipt of letters from parties wanting to buy our cut-off for cutting brick as above set forth. We wish to say to the brickmakers through the Clay-Worker that we do not furnish this cut-off to be used on any machine except our own make.

MICH. BRICK AND TILE MACHINE WORKS,
Morenci, Mich.

A Letter of Recommendation.

Minneapolis, Minn., June 28, 1889.

Mich. Brick and Tile Machine Works, Morenci, Mich.

GENTLEMEN—Our machine (No. 6 Special) is doing finely. We are making sixty thousand bricks right along every day when we run. We can make more than that when we have good, suitable clay. The machine is all right.

Yours Respectfully,

S. D. MORRISON & Co.,

1500 Washington Ave., North,
Minneapolis, Minn.

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Davis's Bricks, Tiles and Terra-Cotta.

JUST READY.

A NEW EDITION.

A Practical Treatise on the Manufacture of Bricks, Tiles, Terra-Cotta, etc.; including Hand-Made, Dry Clay, Tempered Clay, Soft Mud and Stiff Clay Bricks, also Front, Hand Pressed, Steam Pressed, Re-Pressed Ornamentally Shaped and Enamelled Bricks, Drain Tiles, Straight and Curved Sewer and Water Pipes, Fire Clays, Fire Bricks, Glass Pots, Terra-Cotta, Roofing Tiles, Flooring Tiles, Art Tiles, Mosaic Plates, and Imitation of Intarsia or Inlaid Surfaces, comprising every important product of Clay employed in Architecture, Engineering, the Blast Furnace, for Retorts, etc., with a History and the Actual Processes in Handling, Disintegrating, Tempering and Moulding the Clay into the Shape, Drying Naturally and Artificially, Setting, Burning with Coal, Natural Gas and Crude Oil Fuels, Enamelling in Polychrome Colors, Composition and Application of Glazes, Etc., including Full Detailed Descriptions of the Most Modern Machines, Tools, Kilns, and Kiln Roofs used. By Charles Thomas Davis. Second Edition. Thoroughly Revised. Illustrated by 217 engravings. 501 pages. 8vo.

Price \$5.00, by Mail, free of postage to any address in the world.

CONTENTS—Chapter I. The History of Bricks. II. General Remarks concerning Bricks, Their Size, Strength and other qualities. Ornamental Bricks, Architectural Terra-Cotta, Blue Bricks, Salt-peter Exudations upon Brick Work. III. Enamelling, Glazing and Ornamenting Bricks and Tiles, Earthenware, etc. IV. Selecting Clays for Various Kinds of Bricks—The Different Varieties of Clay—The Characteristics, Qualities and Localities—How to Color Bricks Red—Kaolin—Terra-Cotta Clays—Fire Clays—Exploring, Digging and Marketing Fire Clays—Washing Clays. V. Making and Burning a Kiln of Hand-Made Bricks. VI. Manufacture of Dry Clay Bricks. VII. The manufacture of Tempered Clay Bricks, including a description of the Most Modern Machinery Employed. VIII. Kilns. IX. The Manufacture of Pressed and Ornamental Bricks. X. The Manufacture of Fire Bricks. XI. The Manufacture of Drain Tiles. XII. The Manufacture of Sewer Pipes. XIII. The Manufacture of Roofing Tiles. XIV. The Manufacture of Architectural Terra-cotta. XV. Ornamental Tiles, Etc. Index.

A circular of 6 pages quarto, giving the full Table of Contents of this important book, with specimens of the illustrations, will be sent free of postage to any one in any part of the world who will furnish his address.

HENRY CAREY BAIRD & CO.,

INDUSTRIAL PUBLISHERS, BOOKSELLERS & IMPORTERS
810 Walnut St., Philadelphia, Pa., U. S. A.

OUR 1889 CATALOGUE

Is in Printer's hands. Parties desirous of obtaining same will please forward their address at once to insure prompt mailing. Address,

Link-Belt Machinery Co.,

CHICAGO & MINNEAPOLIS,

—OR—

Link-Belt Engineering Co.,

NICETOWN, PHILADELPHIA, PA., &

49 DEY ST., NEW YORK, N. Y.

[Mention the Clay-Worker].

FOR SALE, WANTED, ETC.

Advertising rates in this column 20 cents a line, or 3 cents a word, each insertion; about seven words make a line. Cash should accompany the advertisement to insure insertion.

FOR SALE. Two Whittaker Semi-dry Machines in good condition. Can be seen at work. Address 71 d. WHITTAKER BRICK CO., Kan. City, Kan.

WANTED. A temperate, skillful brick sorter. Address, stating experience and salary expected, (71 t.) W. D. RICHARDSON, North Baltimore, O.

WANTED. A situation by an experienced and reliable brickmaker and burner. Familiar with old and new methods of burning. Address 71 f t. "BRIX," Care Clay-Worker.

FOR SALE. One Wallace Clay Crusher and Stone Separator, also one pug mill; both in good repair, regardless of cost. J. W. BECKETT, E. E. Pittsburgh, Pa.

WANTED. A brickmaker who understands running Penfield Machine and is a good burner, to take charge of a yard at Decatur, Ala. P. H. MORRIS, 71 d. Eufaula, Ala.

FOR SALE. Stedman Pulverizer; new improved. 40-inch, with fly-wheel; in perfect order. CARTERET BRICK WORKS, Carteret, N. J.

FOR SALE. Clay land on track; unlimited cash demand for brick in Duluth, St. Paul and Minneapolis. Address F. McNAMARA, Little Falls, Minn.

FOR SALE. One Whittaker Semi-dry Brick Machine; one Stedman Pulverizer; one Bucket Elevator; all in good order, having made only about 600,000 brick. J. M. HARRY & CO., Dallas, Texas.

FOR SALE. One Grand Automatic Pug Mill complete with two 36-in. pulleys, used only four months, almost new. For sale cheap. Address at once WESSELS & NIEMANN, 44 c. Jefferson Ave. and Cherokee Sts., St. Louis, Mo.

WANTED. A good sewer pipe pressman to run the Barber Press. Also a good trap and chimney top moulder. None other than sober and steady men need apply. Address PACIFIC CLAY MFG. CO., 71 d. South Riverside, Cal.

WANTED. A position as foreman in sewer pipe or architectural terracotta works, by a practical and reliable man, industrious and sober and fully competent to manage either of the above works. Address SAIL-SILICATE, Care of Clay-Worker.

WANTED. A position as foreman by a practical brickmaker in a brick or tile yard. Has had 25 years experience in handling clay in all its forms of manufacturing and can furnish good references. Address 71 p t f. S. K. T., Care Clay-Worker.

WANTED. Situation as Superintendent of brick works. 15 years practical experience in the manufacture of brick by dry press or stiff mud processes and the building of kilns and burning same for common, paving, or face brick. Address G. R., 71 c. Care Clay-Worker.

WANTED. Position as superintendent in a brick yard by a thoroughly competent and reliable man. Understands making mud brick, wire-cut and dry-press process, but would prefer the latter. Can burn with wood or coal. Address D. PRESS, 71 f t. Care Clay-Worker, Indianapolis.

FOR SALE OR RENT. Brickyard near Richmond, Va. 21 acres, railroad switch to the kilns, abundance of best clay, new buildings, sheds, clamps, wheels, monoids, barrows, mules, carts, etc. For information, apply to JOHN C. GIBSON, Richmond, Va.

46 c. or J. J. Gordon, P. O. Box 228, Cincinnati, O.

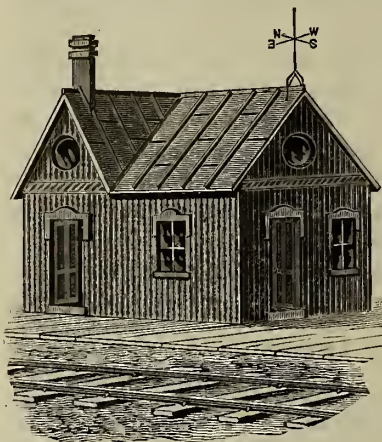
FOR SALE. Two Pug Mills, one Chambers Compound Roller, new, cost \$1,200, will sell for \$500; 9,000 Chambers Pallets, cost 70 cents, will sell for 25 cents, as good as new; 17 Drying Tunnels; 3 Transfer and 3 Dump Cars; large amount of belting, shafting and pulleys; all the above as good as new. Apply to C. E. EHLERT, Room 1, 167 Dearborn St., Chicago, Ills.

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We have recently supplied many large Brick plants with our superior plain and corrugated Iron and Steel roofing and siding—an arrangement which has proved highly advantageous and satisfactory to the proprietors of those establishments.

On account of the fire and lightning proof qualities of our material, as well as its great durability, lumber bears no comparison for service.

Those of the trade who contemplate erecting new plants, or remodelling or enlarging old ones, will do well to correspond with us for catalogues and full information.

Sketches or dimensions for estimates will receive prompt attention.

THE CINCINNATI CORRUGATING CO.,
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CHICAGO, ILLS.

NOTE—To any responsible party sending us measures, we will ship a "Leviathan" Belt on sixty days trial; to be paid for if satisfactory.

THE CLAY-WORKER

VOL. XII.

INDIANAPOLIS, IND., AUGUST, 1889.

No. 2.

Written for the Clay-Worker.

EXAMPLES OF AMERICAN BRICK AND TERRA COTTA WORK.

No. 18.

THE COMMERCIAL NATIONAL BANK BUILDING, CHICAGO.

By the recent annexation of numerous suburbs at Chicago is now the second city in point of population in the United States, and in some other respects we are inclined to think that it is a little ahead of its larger rival. Certain it is that no city in the world has ever made such rapid, substantial growth in the same length of time as has this great turbulent heart of commerce during the past decade. Block after block of immense ten to fourteen story business and office structures have sprung up as if by magic, many of them in elegance of finish and appointments being marvels of perfection. In viewing these great buildings those not familiar with metropolitan life can but wonder at the source of such great wealth. Where do all the people necessary to fill these vast structures come from?—How do they sustain themselves and whence comes the almost untold riches? are questions that puzzle the mind and plays upon one's fancy.

Clay workers especially can look upon these modern buildings with gratification for the products of their skill and labor enter most largely into their construction. From the brick foundation to the tiled roof these handsome and indestructible palaces are composed mainly of burned clay.

The subject of our sketch this month, the Commercial National Bank Building, is located at the corner of Dearborn and Monroe Streets and occupies a lot 90 by

131 feet. It is six stories and basement in height, the basement being of blue Bedford stone and the remainder of dark red St. Louis pressed brick with trimmings of Perth Amboy terra cotta.

The first floor is occupied by the bank and presents an exceptionally fine interior designed by the architect, Mr. Scott, of Chicago. The remainder of the building is fitted for offices.

The illustration is by Paul C. Lathrop, from the original design of the architect.



THE COMMERCIAL NATIONAL BANK BUILDING, CHICAGO.

ABOUT \$800,000,000 were spent in buildings during 1888 in the United States. Judging from present indications, this sum, large as it is, will be exceeded this year by about \$1,000,000. These figures are enormous and show to what a great extent the building interests are carried forward. A large amount of this money was spent on buildings that replaced others and for repairs, but by far the greater amount was expended on

buildings placed on new sites, thus adding materially to the taxable wealth of the country.

BUSINESS SUCCESS.

John Wanamaker, the millionaire merchant of Philadelphia, the Postmaster General under the Harrison administration, was asked by a newspaper reporter to explain the secrets of his wonderful success. Here is a portion of the response: "Trade is the keenest thing in the world, and it is so because it has to measure with the people. You must have brains and morals to make a great business as well as to make a good character. If a lady comes into my store and says she wants Scotch linen, no clerk of mine is permitted to show her anything else. There might be other goods on which we could make more money, but the clerk must not even mention them. It is our duty to give the people just what they want, and the same prices at the same moment to everybody. There are departments here in which old fashioned goods left on makers' or jobbers' hands by the introduction of new and better goods could be disposed of at snug profits. Some customers would not know the difference in the goods.

There are mercantile concerns which make a business of 'working off' these old stocks at retail which wholesalers cannot dispose of, because they sell to merchants who know goods. No such wares will be found in my store. I spend \$5,000 a week in advertising, and pay a skillful man—a former newspaper editor, and a good one—\$1,000 a month to do it for me. I make money by it. Advertising is the leverage with which this

store has been raised up. I do not see how any large and successful business can be done without liberal advertising. Continuous advertising like continuous work, is the most effective."

Written for the Clay-Worker.

OBSERVATIONS FROM A CAR WINDOW

BY PROF. R. T. BROWN.

Modern travel gives but little opportunity to study anything, and even the observations that it permits are made in so hurried a manner that they lose much of their value. I recently made a journey to the northwestern part of Montana, by way of the St. Paul, Minneapolis and Manitoba Railway. This carried me through three or four large cities and over a vast expanse of territory, to conceive the future possibilities of which would tax an imagination much more active than mine. Among my "Notes by the Way," I find some things that may interest or amuse the readers of the Clay-Worker, and so I give them nearly in their original crude form.

CITIES.

Chicago is the wonder of the age. I can see no reason why it should have been built here; or indeed, why it should have been built at all. There was no good natural harbor here to invite the location of a commercial city. Its site was originally a low range of sand hills but little elevated above the lake surface and nearly surrounded by a great marsh. But in spite of all these natural defects, Chicago is a great city—the outgrowth of indomitable energy and untiring perseverance. It is built to stay. What impresses a stranger at first view is the permanent character of the buildings. Since the great fire Chicago, has learned to build with brick; but Chicago is built on faith in it as a great commercial center.

St. Paul and Minneapolis are twin cities, the outgrowth of a great industry stimulated by the enormous power produced by the falls of St. Anthony. The entire volume of the Mississippi River is here available as a water-power, and is chiefly used in the manufacture of flour. By the report of the Board of Trade of Minneapolis, the daily product of these mills is about 33,000 barrels of flour. The Pillsbury Mill, a stone structure, six stories high, makes 7,200 barrels of flour every day. This stimulates every other industry; and though this is a great center of the Northwestern lumber trade, the cities are not built of pine. They

are substantially built of brick and stone, the latter material being more frequently used than in Chicago, in consequence of the abundance, and good quality of stone in the vicinity. Excellent brick, however, is made and used here, but the burning has to be almost entirely with wood, which is becoming scarcer every year. These cities, each claim a population of about 200,000. They are on opposite sides of the river and were originally nine miles apart, but are now beginning to overlap. A few iron bridges will make them one.

From Minneapolis to the Red River valley, a distance of 300 miles, the country is in a fair state of cultivation, but the farms generally retain the primitive wooden building, though occasionally we see a modern brick farm house. Judging from the appearance of the clay in cuts along the road, as well as in the brick used in buildings, good brick material is abundant in this region, though fuel for burning is not plenty. Red River valley is the most notable wheat field on the continent, if not in the world. It is about 200 miles long with an average breadth of 50 miles. It is depressed 300 feet below the plain surrounding it, and is elevated only 700 feet above tide water. The valley is devoted to the cultivation of spring wheat and oats. Grand Forks county (the point at which we crossed the river) with an area of 936 square miles produced last year 5,400,000 bushels of wheat and 3,000,000 bushels of oats.

THE PLATEAU DE SIOUX.

Here we enter the Great Plain, stretching westward seven hundred miles to the Rocky Mountains. Our line is nearly along the water-shed between the Gulf of Mexico and Hudson Bay, and therefore we crossed no river of importance for 500 miles. The surface is comparatively level with neither mountain nor marsh in sight and scarcely a tree to obstruct the vision in any direction. The early French explorers called it the Plateau de Sioux because it was the home of the great tribe of Sioux Indians who claimed it and the herds of buffaloes that fattened on it. Small lakes were in sight occasionally, and at long intervals the lonely cottage of some brave man who chooses to endure this solitude for the sake of a home of his own.

The soil is a porous, sandy loam, very productive of wheat, oats and potatoes, but building material or fuel is certainly scarce on this line.

In parts of Dakota south of our line of travel there are beds of coal, but how

extensive they are, has not yet been ascertained. Near the western boundary of the Territory I saw one place in which lignite, a variety of light coal, is being mined, but I had no opportunity of examining it. Good brick clay, can, no doubt, be obtained at various points along this route; but whether it would be cheaper to bring fuel here to burn it, or to burn the brick where the coal is and bring it here ready for use, is a question of economy that must be decided. If brick can be made by machinery, on a large scale near the coal mines of Montana, where I examined some promising specimens of brick clay, it will probably be the cheapest building material available in the northern part of Dakota. I neither saw nor heard of any building stone after I left the granite quarries at St. Cloud, in Minnesota, till I reached the Milk River country. At Fort Benton, 40 miles below the Great Falls of the Missouri, I saw portions of the outbuildings pertaining to the old fort, built of unburned brick, yet standing. At the same place, and at Great Falls I saw, in buildings recently erected, specimens of excellent brick, whether judged by hardness or color.

At Helena, building stone is abundant and of a good quality, and most of the better class of buildings are constructed of that material, though brick is being used to some extent. A good quality of brick clay is found in the vicinity of the city, but the scarcity of fuel prevents its extensive use.

Perhaps the largest unbroken area of fertile land on this continent is found on this plateau lying between the Missouri River on the southwest, the Sioux and Red River on the east, the Rocky Mountains on the west and extending indefinitely into Manitoba on the north. This embraces the better part of the two Dakotas, nearly one-third of Montana and an undefined portion of the great northwestern plain of British America. Cultivated to its highest capacity it could supply the bread market of the civilized world, and is certainly destined to take a leading position in the production of all cereals except Indian corn.

But a scarcity of building material and in some parts, of fuel likewise, will somewhat retard the rapid occupancy of this great empire and the development of its rich resources. But the universal distribution of clay is a beneficent provision pointing to the cheapest and best supply of building material. Moreover, the climate demands a building that

will shut out the blizzard and economize the heat derived from a scanty supply of fuel. Coal transported 100 miles or more to burn brick will make an expensive house, but when it is well constructed, the pioneer has secured comfort for himself and family, and for posterity, indefinitely—a home. But we are nearing the period when brick will become a commercial article, and the man wishing to build, in town or country, will order brick as he orders other supplies from the market. When an article is produced by hand labor, it is supplied as custom work, when needed; but when expensive machinery is employed in its production, the product enters the market as an article of commerce, securing, generally, a reduction in price and a greater uniformity of quality.

Written for the Clay-Worker.

HINTS ON BRICKMAKING.

No. 38.

BY "R. BRICK."

SETTING BRICK IN KILN.

By special request I again take up the subject of setting brick and reproduce the illustrations used in a former article on this subject.

All brickmakers recognize the importance of properly burning their wares. This cannot be done, however skillful the burner may be or how good the kiln, unless the bricks have been properly set in the kiln; and much of the bad burning is due to ignorant or careless setting of the bricks. A slight obstruction will change the course of heat, it being most sensitive. It is necessary that the spaces left for draft be as nearly as practicable uniform through the kiln. Where they are set three over three, or eight over eight, the setter has a guide, and only by carelessness can he go wrong, but in the setting of the benches and overhanging courses he has no such guide and must use his skill.

Most setters hack the brick in the benches, that is, break joints. This is, I think, a mistake, as it prevents the heat from moving upward, from the benches to the body of the kiln, so that all the heat must pass through the overhanging courses to reach the body of the kiln.

The benches should be set so that the heat can get into them from the arch or fire flue, and be able to pass freely from the benches directly upward into the

kiln. I will illustrate my idea by the following diagram:

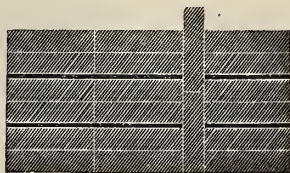


FIG. 1.

Fig. 1 represents ground plan of the bench, between eyes or arches of kiln. This is a three-brick bench with a stretcher between, known as a three-and-a-third-brick bench. The bricks are set in pairs as shown.

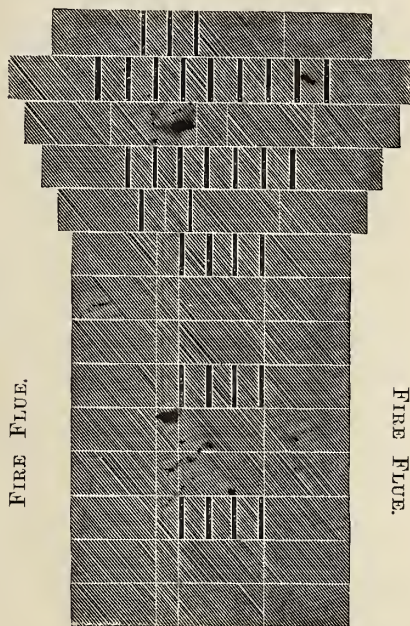


FIG. 2—ELEVATION.

Fig. 2 is the elevation of end view of bench, showing stretchers in third, sixth and ninth courses in middle course, up to overhangers; then each alternate course in middle between overhangers is stretchers.

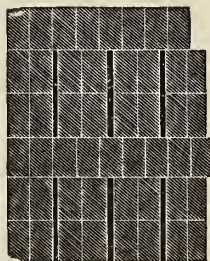


FIG. 3—ELEVATION.

Fig. 3 is elevation of bench next to fire flue or arch, showing first and second, and fourth and fifth courses set in pairs, one directly over the other.

This shows only six courses. I think it better to set nine straight courses as shown in Fig. 2, the third, sixth and ninth courses tight as in Fig. 3, the third,

sixth and ninth courses in middle bench, which are on a level with tight courses in bench next to fire, are set stretchers as shown in Fig. 2. This allows the heat to pass horizontally into middle bench, then vertically between the pairs and through stretcher courses into the kiln; when they are set in pairs they have one straight face. The stretcher between the courses from bottom to top prevents the fire from running from one arch to the other, as it will do when one arch is hotter than the other, but still allows sufficient circulation of heat through the bench. There is but one tight course above the bench, that is the binding course, which is immediately over the closing courses—one-half resting on each course. This is set tight only on the "quarters" of the kiln and loose next to the wall and through center of kiln. I think in setting above the arches they should be set with a little space for draft next to the wall and across each end. Set top course same as the balance, and use two courses flat, on top bottom course, crosswise of top edge course and one inch between bricks—top course to be of good square burned bricks crosswise of bottom course and close together.

This plan of setting the arches can be adopted without the stretcher, that is, it can be a three-brick bench instead of three and one-third, and will carry the heat from the arches freely to every part of the kiln, as well with or without the stretcher shown in Fig. 1. After twenty years experience in setting and burning brick, and after trying many ways, I believe this the simplest and best plan to preserve the shape of the bricks and to allow free passage of heat from arch to bench, and thence upward into the body of the kiln.

These cuts were shown in October, 1887 No. of the Clay-Worker. I have received several letters from parties who have adopted this plan and always with good results.

The spaces between the piers in the bench should be five-eighths of an inch, also between stretchers shown in Fig. 2. The spaces between brick in overhangers should be at least one-half inch. The first overhanging course should be carefully spaced, the others are regulated by the first.

The header back of overhanger should be exactly even with it so that heat can pass horizontally, two lengths of brick then up between stretcher course.

The plan if tried should be followed strictly, to get the full benefit of it.

Written for the Clay-Worker.

BRICKMAKING AND BURNING.

No. 5.

BY J. W. CRARY, SR.

In my former articles I have given some general directions about selecting clays for brick and for preparing them and making and burning them into brick.

Most writers (not excusing myself) are egotistical, vain and self conceited, and the *wear* and *tear* of pronouns of the first person singular, is dreadful. Still "I," "me," "myself" at the right time and in the proper place, makes a better show for true energetic and forcible manliness, than "he," "we," "they," "it," with a vain pride for fastidious modesty. You always know where to find "I" but "he," "we," "it," and "they" are sometimes awful dodgers.

I will now state a fact which I defy any experienced clay hunter and worker to deny, and as I cannot very intelligently explain it myself, I will call on some professor, who can give you all you want to know about brick, (whether he ever saw a kiln made and burned or not) to solve this question. I have never seen a clay bed East, West, North, or South, upon which a variety of timber grows but what will make good brick. It will not crack in drying or check in burning, and generally, will burn red color. I have never seen a clay bed where there is or was no other timber than oak or pine, but what would crack in the sun when molded soft and easily check in burning. Will some facile, juvenile, versatile writer tell me why?

When I speak of clay on the surface where any timber grows of course no reference is made to antediluvial or primitive clay, or what is commonly called fire clay or potters clay, nor do I refer to alluvial clays, such as are found on the low banks of the Mississippi and other rivers, but such as are found on the plateaus or table lands of our rivers and valleys. Most of these lands have a variety of timber on them.

Oak and pine clay lands, have generally, a large proportion of calcareous matter. Traces of fossil shell fish may be seen in the pine or oak clay lands of the South, especially in Alabama or Mississippi. These clays dry fast when moulded soft and shrink more than other varieties, and being poor in silica and rich in lime the particles have not time to arrange themselves into a solid crystal while the water is evaporating.

As a proof of this theory, if we add sand, say one-fourth or less, as the case may be, we find no cracking; if we dry the brick under sheds we have good, strong, whole brick; if we press the clay dry when well pulverized, we find no cracks, but a good, strong brick, if properly burned. This kind of clay should have as much sharp, clean sand added to it as it will bear and make a good brick, unless it be manufactured by a first rate dry press machine.

BURNING BRICK WITH COAL DUST OR OTHER FUEL MIXED WITH CLAY.

A few years ago, (and I presume the practice is continued) nearly all the brick made on the Hudson River, N. Y., and Raritan Bay, N. J., were made of tempered soft clay, and from three pecks to one to two bushels of fine coal dust was tempered in with each thousand brick. The brick to be set around on the outside, and "heads" of kilns had double the quantity of dust. When a kiln was ready to fire, wood was used sparingly and when the arches became hot enough to ignite the coal in the brick, very little wood was used and the doors were kept closed, with just enough air admitted to keep up combustion. The heat would follow close after the water-smoke and the top of the kiln would be harder than the bottom.

A CHEAP BUT BAD WAY OF BURNING BRICK.

The brick burned with coal dust tempered in with the mud or of clay containing lignite, (as is used extensively in Middlesex Co., Raritan Bay, N. J.) are of inferior grade. First, the water-smoke is driven off too rapidly, warping, checking or water-setting the brick. Second, the inside of the brick becomes fused, while the outside is partly chilled and remains comparatively soft. Third, the brick are discolored and have a motley appearance and the grain or texture of the brick being uneven and entirely dissimilar, it is liable to chemical and atmospheric action.

The difference between the intrinsic value of a thoroughly and evenly burned brick, and one that is half fused and half burned, cannot be compensated by any kind of economy in fuel or burning.

When all architects and builders get to know a brick the man who can burn a thousand brick with three pecks of coal and a wheelbarrow load of wood or 25 cents worth of gas, will be out of a job and good brick burning will take high rank as a profession.

I have not a doubt that the time will come after our natural fuels have been

much or nearly exhausted, when heat for burning brick and for many purposes not now thought of, will be developed from water power and electricity.

The dynamic forces of these elements can be cheaply transmitted from the ebb and flow of tides as a motor and from the water powers of streams to the whole country, but the clay worker need not be troubled about that just now, especially in Indiana, so long as your great subterranean gasometer will supply you; but look out for an explosion that will fearfully diminish the Hoosier population, when you get out enough of that gas to let in a certain quantity of air. I would advise you to insure the Clay-Worker, sometime within the course of fifty years, provided, you have an Earthquake Insurance Co., and I think you will.

I have said in my former articles, that clay that will crack in sun-drying should be tempered in a pug mill, water being added to it only one time; that clay which is loamy, or charged with sand so as to make it short or weak, should be tempered in a pit and worked until it is stiff, then watered; this process of tempering and watering should be continued, until the clay particles become so disintegrated that the whole body feels plastic to the touch. Millions of good, fair building brick, are made on the river bank at New Orleans, La., in this way, of the deposit of sandy mud or battue. It is taken out when the river is low and kept in store for spring and summer use, and the next succeeding high water replaces the mud taken out, so that the excavation is not seen. Thus the great "Father of Waters" carries on his work of alluvion, which has furnished mud for brick, and millions of fertile acres for agriculture.

BURNING PLASTIC CLAY BRICK AND DRY PRESSED CLAY BRICK.

I have already given some directions for burning and setting brick. In my former articles of this series, I stated that there was a material difference between the right way of burning the two kinds of brick above mentioned. A mud brick having much more water to evaporate than a dry pressed brick, when dried off, will, of course, be more porous than a dry pressed brick, and will absorb heat more rapidly. If, therefore, the two kinds of brick are set in one kiln separately, it will be found that the mud brick will be dried off and the fires up sooner than the dry pressed brick. It is therefore evident that the dry pressed

brick should be fired slow, steady and carefully, for if fired to keep up with the mud brick they will expand or swell so as to partially lose the cohesive attraction the particles of clay have assumed under pressure. This is of the first importance for if the cohesiveness of the particles of clay be once disturbed, nothing can restore it.

BURNING DRY PRESSED BRICK DIRECT FROM MACHINE.

If your clay has been dug and hauled when dry as it naturally gets in the bed, and stored under a good shed, it will be in good condition to press after three or four weeks under shed. It will get but very little dryer under a shed than it was in the bank, but it will be uniform in dampness and mulled, ready for the pulverizer.

Clay in this condition will be dry enough to go at once into the kiln from the machine. Brick can be well burned if dry enough to stand in a kiln without crushing, provided they are evenly well set and the firing very slow and careful. If the clay be frozen when pulverized in a so-called dry state, it may be pressed and set directly into the kiln, but if pressed damp without being frozen, and then frozen, it will not be a brick when thawed, but a crumbling body of clay, unless kept frozen and exposed to the air a long time. Dry pressed brick should be set even and open. A good and safe rule is to set five on edge, on the distance or length of two, or say three-quarters of an inch apart. As I have said in previous articles, the benches and overhangers, should be set skintling or diagonally across, one or two in form of letter X. This should continue until the binders are on and ready for first running, or lengthwise course across the kiln. For common brick I prefer to set skintling all the way to the top. If set even this way the circulating draft and flame is more regular and diffusive. It requires more skill to set skintling, but a setter can set much faster. When a kiln is set skintling the course of draft up through the kiln is serpentine, and the circulation of heat is more lateral, and better distributed than when the brick are set transversely, three over three. The benches of a dry pressed kiln may be a brick wider than for mud brick, as the clay, dry pressed, will stand more fire. Five courses wide will do well with good burning. Forty brick high is a good maximum for setting a kiln. The width may vary but I prefer a narrow kiln, not over 24 feet wide. The fires

can be worked and controlled well in this width of kiln.

I have spoken of fusible and infusible clays, and have shown that the infusible clays will not shrink or settle by burning, and that the fusible clays will stand fire better by being dry pressed. When a dry pressed kiln is ready to fire, if with wood, the greenest, or if all dry, that which has the least resinous matter, should be used first, for if much black smoke passes up through the kiln when cold, it will coat the brick in spots. This not only chokes the draft, but is a non-conductor of heat, and what is called a chill or cold spot is likely to ensue. This is not infrequent with ignorant burners; some call it "witch in the kiln." I have seen them dig to the arches to get it out, but the best way to get the "witch" out, is to pour water enough down from the top, to start hot steam from the hot arch, then it will follow up by pressure of steam. But this witch must be prevented by a very slow and clean fire. If coal be used, hard coal is best for drying off; bituminous coal is best after the kiln is hot. When the fires are all out at top, the heat should be increased until the overhangers show signs of fusion or glazing; then this heat should be kept steady, until it appears on top. In clays that don't melt by heat or settle, the the platting will first show a white sulphuret of any alkaline matter in the clay. Then as the intense heat appears under the platting, a sulphuret of iron, or what burners call "brown sulphur," will coat the edges of the platting. This is a sure sign of hard brick from bottom to top, as all the mineral substances of the clay have become completely oxidized. This efflorescent appearance of oxidized substances in clays is the true indication of the quality of a burn, and not the settle, as common brick burners believe. If clay melts at a low heat, as soon as the arches get red hot, the danger of fusing may be very much prevented by closing the kiln up tight for five or ten hours. I have closed a kiln at 9 p. m. and opened it at 6 a. m. and found it in good order and very hard to melt afterwards.

Reason: The alkaline salts have been greatly dissipated and ceased to be a ready flux with the clay under a high heat. Thus closing a kiln to let it "cook," is not only good to prevent fusing, but it is the only true and sure way to get out a cold spot or "witch." After closing a kiln tight for eight or ten hours, when re-opened the draft will be very strong and so equalized that all cold spots will disappear.

Written for the Clay-Worker.

SEWER PIPES AND THEIR MANUFACTURE.

BY ALFRED CROSSLEY.

My esteemed friend, the editor of this excellent paper, some months ago requested me to write an article for these columns, on any department of fictile productions germane to the scope and province of this Journal. I regret that my promise then made has been so long in being fulfilled, but my time has been so fully occupied as to leave me little leisure for writing. The subject I have chosen for this article is "Sewer Pipes," not because I feel qualified to do the subject justice worthy of its importance, but because in our trade papers it has received comparatively little attention, and hence some remarks upon it would doubtless prove interesting. At the outset I will say that I do not claim absolute accuracy for everything I may say, but as an Irishman always has the privilege to speak twice I suppose an Englishman is near enough neighbor to be allowed the same, and if any inaccuracies creep in I am ready to "stand corrected." Further, it is difficult to treat on any subject without getting on somebody's corns, or crossing their pet theories (we all have them), therefore don't let some brother say, "that fellow is a crank," just because I give expression to some opinion that does not exactly "hitch" with his. I have no intention, and lack the necessary ability if I had, to write a treatise on sewerage systems as such, for that requires an amount of scientific knowledge not to be expected of the average citizen, but it would be impossible to write anything on the subject in hand without making some reference to the system which sustains it. Sewerage of course is older than the sewer pipe, so also is travelling older than the locomotive, but in the one case as in the other the association of ideas is inseparable. The importance of a proper system of sewerage can hardly be overestimated. Indeed without such the association together in towns and cities of large communities of people with any approximation of continued health would be an impossibility. And yet where this subject has received proper attention even the largest cities are often more healthy than many rural districts. The city of London itself with its 5,000,000 people is shown by statistics to be healthier than many towns of not over ten or fifteen thousand. The importance so justly attached to this subject is shown

by the immense works undertaken by our large cities and the large expenditure of money involved. London commenced her sewerage systems in the year 1531, and from the latest accounts I have read has now 2300 miles of sewers, varying in size from 9 inches to 12½ feet in diameter. The main sewerage scheme, completed and put into operation in 1870 and 1871 footed up a total cost of \$150,000,000. New York has 314 miles of sewers; Brooklyn about 300 miles, of sizes from 12 inches to 10 feet diameter, and costing about \$8,000,000. Providence, R. I., has about 42 miles of sewers, 27 of pipe and 15 of brick, from 12 inches to 5½ feet diameter, costing about \$1,500,000. Chicago has about 350 miles of sewers, from 12 inches to 9 feet in diameter. Philadelphia has about 300 miles of sewers before the adoption of their new system, which cost about \$10,000,000. I have inserted these statistics regarding a few of the prominent cities to give some slight idea of the immense interests directly associated with this industry, which, as it regards the health and well being of the nation is second to none in its importance.

The great interest taken in sewerage works and improvements in recent years both in Europe and America, and the consequent impetus given to the industry now under discussion, cannot properly be classed under the head of modern inventions. It is only a revival and modern application of principles that were well understood and practically applied in ages long past. In fact the early history of sanitary science is veiled in antiquity. The plan of carrying away the filth of a city by underground sewers is very ancient. The temple of the city of Jerusalem had a very perfect system of sewerage, cut out of the solid rock, which is yet in as good a condition as when first constructed. Alexandria, Carthage, Herculæum, Nineveh and Rome had complete systems of sewerage and water works. Says another writer: "The water works and sewerage systems of Carthage, Alexandria, Rome and Jerusalem were both extensive and complete. The Cloaca of Rome has been continuously performing its present duties for about twenty centuries. There are other convincing proofs that at one time in the early history of the human race the art and science of efficient sewerage was well understood by the people of the far East, even as early as the beginning of the Christian era.

If we could find any authentic records

of the very first attempts at sewer construction we should probably find it to have been of a very crude and primitive nature. Before the art of forming cylindrical tubes or pipes from clay and burning them was discovered, wood, stone, and later on brick were no doubt each in turn employed. But it is certain that the use of vitrified pipes from clay was not very long delayed. Sewers built of them have been unearthed in the excavations of Pompeii and Herculæum, which cities were destroyed by an eruption of Vesuvius, A. D., 79.

Rev. F. S. De Haas, late U. S. Consul to Jerusalem, writes:

"Vitrified clay is among the most durable materials known. While the marble palaces, temples and tombs of Rome and other ancient cities have crumbled to dust, those built of brick remain almost perfect. The use of terra cotta for images, ornaments, drain pipes, coffins, and vessels of different kinds, dates back to the remote ages. Sewers and tiling used in construction have been found in Pompeii, Troy and Nineveh, also in Ur of the Chaldees, the home of Abraham, and the oldest city in the world. Here it was in general use, and the tombs are drained with clay pipes as sound as when laid in the ground 4,000 years ago. The coffins also are of the same material, and of different shades, some like caskets with lids, and others round like bottles, which were sealed up after the corpse was inserted, and there they are at the present time by thousands sound as when they came from the potter's hands. Nothing is now known more lasting than terra cotta. Whether the ancients knew the secret of glazing their pipes with salt I have been unable to learn, and it may be that we moderns may take the flattering unction to our souls that in the art of salt glazing we have a genuine invention that belongs to our own age."

Sewer pipes are of course in this article regarded as a product of clay, and I suppose no one doubts now that it is by far the most suitable material for the purpose, all things considered. But the modern history of sewerage shows that various other materials have been employed. Chief among these is iron. Iron has considerable advantage in the fact that it can be made in so much longer lengths, thereby having not over one-fifth or one-sixth the number of joints, and also that it is so much stronger. But on the other hand, it is very much more costly, and what is more to the point the action of the acids contained

in the sewage is found to rapidly destroy the pipe, hence sewers laid with iron pipes in a few years become eaten through and unfit for use, while well made, vitrified glazed pipes are absolutely indestructible. Of this I shall speak later on. This objection to iron as a material for sewer pipes has long been known and recognized and various attempts have been made to overcome it but hitherto without practical success. Mr. W. Bruce, in a paper read before the Edinburgh (Scotland) Architectural Association in 1889, says: "The earthenware pipe is as clean 30 years after it is laid as the day it was placed in position; whereas iron pipes—be they coated or galvanized, or put through any process yet known to us—are corroded inside and outside in a very few years."

In 1860, Henry Kamp took out a patent for "Preserving Iron Sewage Pipes," but it is evident his process has been a failure.

Besides earthen—or stoneware, and iron, the following materials have all been employed in the manufacture of sewer pipes, viz.: stone, wood, glass, bitumen, slag, paper composition, and cement concrete. The study of these covers the modern history of this subject, represented by a period of about 300 years. Some of these I only intend to briefly refer to, although a detailed account of everything relating to the subject is very interesting.

The earliest record that I have read of is dated January, 1619, where, in England, his master granted to John Etherington—viz.: "A speall privilege, shewing that whereas he hath found out the arte of making a certain engine to make cast clay, all sorts of earthen pipes, for the conveyance of water in the earth, and also mullions and transomes for windows, crests for houses, tyles and paving stones." This is probably the earliest attempt to make these wares by machinery, and up to this time all such had evidently been hand made.

In 1725 letters patent were granted to William Edwards for the making of earthenware pipes, and from the description given they appear to have been of a superior quality. They were made from 2-inch to 12-inch in diameter, and the joints were exactly turned to be close fitting, and the pipes were jointed with some kind of cement, described to be perfectly hard in water, and when under heavy pressure the pipes were hooped with rings of fire clay or iron, and used for pumps of great depth.

In 1728 a machine was made for the boring of stone pipes from 1½-inch to 14-inch in diameter, and in lengths from 3 feet to 6 feet and it was stated that those stone pipes could be made as cheap as wooden pipes. In 1734 another machine was invented for making stone pipes, and for making marble and stone coffins.

In 1766 Thomas Lindslee described a kind of composition pipe made of certain proportions of different clays, sand, and magnesia, mixed up with water, kneaded and formed in tin or iron moulds, dried and double glazed with a composition of magnesia, red and yellow ochre, lead ore and quartz, and the pipes were encased for burning.

In 1782 a patent was granted to John Gaittair for the invention of a "stink trap," and, while omitting the details of the specification, it can hardly be doubted that this was the father of all the sewer traps that have since been constructed.

In 1798 William Docker described the making of stone pipes for "conveying of water, smoke, steam, and other fluids," and the socket joints were "made so fine as not to admit of being cemented with a substance thicker than paint."

In 1808 William Bell described the making of tubes of porcelain, pottery, and various compositions which were vitrifiable, and those tubes were used for lining the inside of iron pipes, which shows us that in the beginning of the present century people knew how unsuitable iron was for any pipe conveying sewage. This will strike us as one of those utopian ideas that are very beautiful in theory, but entirely useless in practice.

In 1810 Samuel Hill made loose rims or collars for the jointing of stone pipes, described to be fixed on the pipes with cement, and from the same year dates Francis & Waters' patent joint for fire clay pipes. These pipes were made thick at the ends, and grooved for a tongue of soft material. The joints were placed and bedded in a hollow block, and a similar block cemented on the top of the joint. By the specification it is evident that Francis & Waters claimed the right at that time of making pipes of earthenware above 5 feet in length. Claiming the "right," and exercising it however are two different things, and the record does not appear to state whether they actually succeeded in making clay pipes of 5 feet or over in length. If they could do this practically and economically in 1810 our nineteenth century clay

workers have made a sad mistake in losing the art in so short a time. It would be a great advantage to have our large sized pipes as long as possible but over a certain length it appears to be attended with considerable difficulty in practice. On this I will speak further in the proper place. In the mean time, however, if our sewer pipe manufacturers want the "right" to make their pipes 5 feet or over in length, I don't think they need trouble to go to Washington or London to get it. Nobody is going to interfere with them in such laudable work.

In 1814 John Read described a superior class of earthenware pipes, made with either spigot and faucet, or flange joints, and after the clay was dried the bore was turned, and the pipes glazed inside, and afterward burnt in the kiln. This shows us that up to this time salt glazing had not been applied to sewer pipes.

(To be continued.)

Written for the Clay-Worker.

COST AND WASTE OF FUEL.

BY PROF. J. F. ELSOM.

According to the best statistical data obtainable it appears that with the best processes known, the secrets involved in combustion are very imperfectly understood and the very best results I have been able to obtain is a fraction less than eight per cent. of the heat units present in a given fuel are actually made economic; the rest, over ninety-two per cent, being lost to sight, but to memory dear.

In order to bring the matter to an actual mathematical proportion and with no desire to cast reflections on any kiln, burner or process, I will state that a sample of clay of a certain dryness will show by analysis precisely as much heat, actual measurement, is required to eliminate the water of crystallization. This, as I have told you before, is all that burning consists of, for a heat no matter from what source or how applied, sufficient to do this "burns the brick," but, of course, is susceptible of specific modifications when certain results such as strength, color and the like, are desired. Now with this fact of required heat before us, we will take a given fuel, subject to careful and impartial analysis and the results should enable us to fill the kiln and apply a stipulated amount of fuel and the job would be perfect, but if we do this, the results be about one-eleventh of a finish; strange, but not less strange than true.

Last month, I had samples of over fifty

clays and I expect not many were to be subjected to the same treatment, tempered or molded, dried or burned with the same appliances, hence I had a good opportunity of ascertaining practical results which will be given further on, at least all my customers who have favored me with a report.

When a sample of clay is sent for analysis, about the first thing the chemist does is to determine the amount of extraneous water the sample contains. There are diverse ways of doing this, but the simplest is to keep at a temperature of 100° C. or 212° F. for five hours. If the clay is finely pulverized this will do it effectually but if this heat is continued until the sample ceases to lose in weight is prima facie evidence that the extraneous moisture has all been eliminated, absorbed or driven off, corresponding to the operations of the dry kilns of the brickyard.

It should be borne in mind in this connection, however, that it does not follow that aggregate time multiplied by the temperature will produce the same results. For instance:

- 1.....100°x5=500.
- 2.....50°x10=500.
- 3.....25°x20=500.

The first statement will accomplish it; the second will partially, while the third will scarcely depreciate weight at all, and outside the influences of temperature (very hot days when no fuel is needed), there is no difference in the cost of producing the foregoing aggregate, though one result will be perfect, another partially so, and the last, practically indifferent so far as efficiency is concerned, but when 25 degrees has been reached, the next number is much easier and cheaper attained, and so on to the highest in arithmetical progression, inasmuch as the original heat units have been practically lost in reaching the first, and but one-half additional loss will be needed to reach the second, and one-fourth the third, and so on.

With these tests suggested, I requested the manufacturers to make a few bricks, get rid of this extraneous water in any way (the easiest way is by means of the water bath; boiling water being at about the required temperature) burn them carefully according to rule and report results, and this is how the letters read:

Heat required.	Heat used.*	Time.
1. .3916	31.082	12 hrs.
2. .4681	47.188	13 "
3. .2721	33.929	12 "
4. .3644	38.888	10 "
5. .5885	62.789	11 "

6. .3023	38,229	15 "
7. .7654	75,722	18 "
8. .5105	56,626	15 "
9. .3333	41,010	17 "
10. .2702	31,313	10 "

*Good hard brick of even color followed each test.

Of course it cannot be expected of me to give instructions how these results were estimated in figures, as these gentlemen purchased this knowledge and is no more my property than a load of brick I might sell, but is sufficient for present purposes. These brick burned without water-smoke. Why? Because the surplus water present in the clay had been gotten rid of and different fuels were used—wood, coal, oil, peat, gas, both natural and artificial, and mixed fuels, all the restrictions I placed was a crude test for examination of the brick while being burned when they responded to this they were removed from the fire and buried in sand to cool off without absorption.

It will be noticed that certain results and requirements were reached at differ-

tion and other contingencies well known to most of my readers.

All the melody of machine and kiln men cannot drown the "still, small voice" that came piping from the demonstrations, but like Banquo's ghost will not down. They teach first that there should be no water-smoke issuing from the burning kiln; further, that when the brick are placed in the last or burning kiln before this extraneous water has been gotten rid of, at least five times the heat is required at the ordinary temperature of burning to drive off than at the temperature suggested, for the reason that when one brick does become dry, it is in just the right condition to absorb the steam and moisture from those not thoroughly dry. The same difficulty is apparent when the bricks are hygroscopically unlike.

Just here is a point I would like to make regarding the "blushing" of brick in certain portions of the burning kiln, but as I do not wish to exceed my limit of space, I will be forced to leave this for another time, suffice it to say that I hope

MEY'S CLAY ELEVATORS FOR ELEVATING WET OR DRY CLAY.

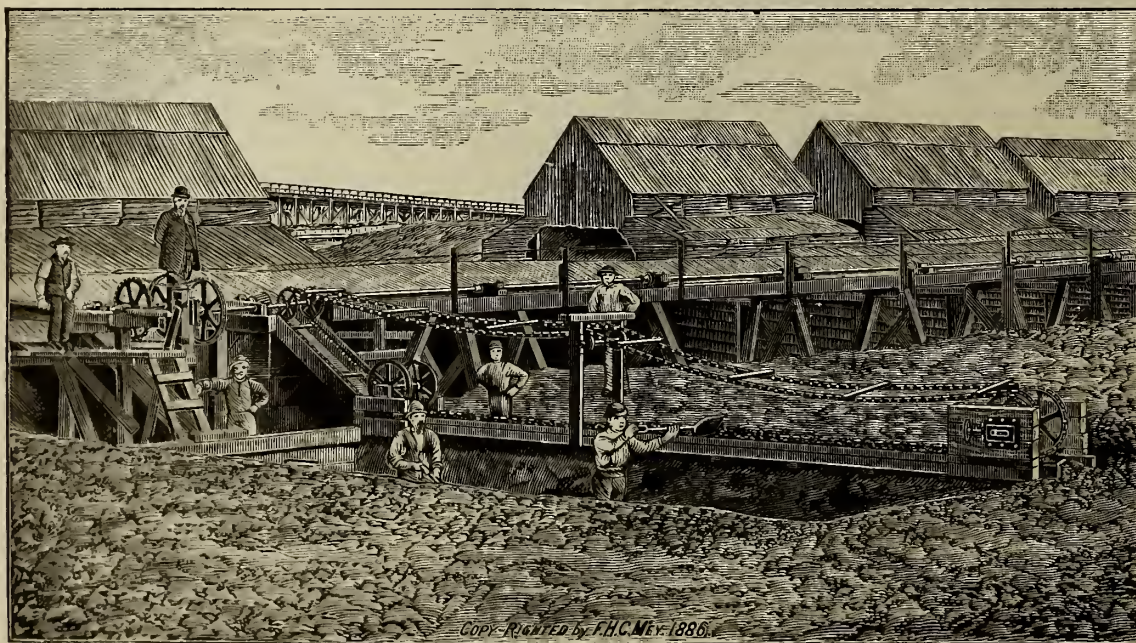
The method of conveying clay from bank to machinery which is here illustrated has been in successful operation at various places for several years and has proved very economical and efficient.

It dispenses with the old method of shoveling or wheeling from the pit into the machine, an advantage that will be appreciated by all practical brick manufacturers.

The conveyor will take the clay from the bank, though it may be a long distance from the machine, and deposit it directly in the machine, thus requiring but one handling.

Where soak pits are used the Elevator can be set at any convenient place and the pits dug on one or both sides as may be desired. This does away with building a raised platform or pit back of the brick machine, thereby saving more than the cost of this Chain or Cable Elevator and being on level ground it is much easier to fill the pits where the clay is

hailed in carts as the horses can draw heavier loads with less effort. If there is a pit on each side of the Elevator they may be filled and emptied alternately, enabling the operator to run the brick machine every day. It requires but little power and will elevate the clay as fast and in just such quantity as wanted. The pitmen can also handle more clay with less labor by using this Elevator than by the old way of getting clay from



MEY'S CLAY ELEVATOR AND CONVEYOR.

ent periods of time, no two, so far as reported, working alike, not only as required by my laboratory test, but they carry with them no rule of proportion upon which a general rule can be based, proving conclusively as I have argued in the presence of many of you that no two banks, aye kilns from the same bank, can be treated in accordance with any proscribed inflexible rule, but must be governed by season, temperature, condi-

tion to have the requisite data in a short time to prove that the presence of this extraneous matter, water, in the brick when the fires are started is actually responsible for these parti-colors in the burned brick more than all other things combined.

A certain style of shoe button is called "Old Maid's Wedding," because it never comes off.

soak pit into the machine.

Different kinds of clay may be mixed more readily and thoroughly by this method as the light clay can be put in one part of the pit and the strong clay in another and if there are two pitmen one can handle the light and the other the strong clay, both going into the machine at the same time and in the proper proportion to insure the best product. Mr. Mey, the inventor of this

system, has devoted much time and study to this subject and maintains that it is in several respects superior to any similar device. Those interested can obtain further information by addressing the manufacturer, Mr. F. H. C. Mey, 64 and 68 Columbia Street, Buffalo, N. Y.

BRICKMAKING AND MOSAICS IN CATALONIA.

The United States consul of Barcelona, in his last report, says that hand moulded bricks occupy, beyond all dispute, the most important place among the various industries comprised under the general denomination of ceramics, both on account of their numerous and important applications, as well as of the large number of laborers employed in their manufacture. The process is of the most rudimentary nature, both as regards the moulding and the baking. The moulding is done on a large uncovered brick floor, where, in the event of a fall of rain, the work of many days would be ruined and rendered useless. The baking is performed in ovens constructed near the moulding floor, the intermittent system being employed. The importance of this industry in Catalonia is very considerable on account of the large exportation of the articles to the island of Cuba, where, however, special shapes are required. The process of manufacture consists in a rough sieving of the clay, which being kneaded, is placed in wooden or iron moulds. This, as before mentioned, is done on an uncovered brick floor, where the moulded bricks are left until entirely dry, being frequently turned to obtain this result as quickly as possible. When dry they are carried to the ovens, where they are piled in castle shapes, with intermediate spaces sufficiently large for the free access of the flame to all parts of the pile, thus producing an even baking of the bricks. Besides the common type of bricks, others are occasionally made and baked in the same oven, especially those called Roman tiles. These, which were formerly used throughout the country, are now everywhere discarded on account of the cheapness and lighter weight of the mosaic tiles which have taken their place. A short time ago the manufacture of floor bricks constituted a very important industry in Catalonia, and although now, on account of greater exactions of style and luxury, it has somewhat lost ground, it still holds a high place among the Catalan industries. The bricks, which are $5\frac{1}{2}$ inches square,

are of two kinds, white and red. The clay used is of the best quality. The kneading of the clay, which is done very carefully and completely, is performed by hand, as is the case with the moulding and cutting of the bricks into their definite shape. The bright red color is obtained by applying before cutting a bath of barbotina (worm seed) to the bricks, selecting for the purpose a special kind of clay, very plastic, of a bright red color. The floor bricks which have acquired the most fame abroad are those manufactured at La Brisba, a small town near the city of Gerona, where the clay is of a particularly excellent quality. The manufacture of machine-made tiles is considerably developed in the province of Barcelona, where two important factories turn out a large amount of work. The material used is a plastic clay or marl of a yellowish color, which, after a thorough baking, whitens considerably. Formerly the clay used came exclusively from the mines of the towns of San Saturnino de Noya and Gelida, about thirty miles from Barcelona. The clay is powder having been sieved, is kneaded by means of an apparatus with blades disposed in screw shape, whereby the cake is obtained out of which the tile is manufactured. The moulding is performed by means of a pressure machine, the main feature of which is an iron cylinder of hexagonal shape, having on each face the shape of the upper side of the tile, and against which, on revolving, a workman applies a cake of clay, a definite shape being obtained from the matrix, which contains a mould of plaster or delf with the imprint of the lower side of the tile. The tiles, after being dried, are piled in the oven and baked. In one of the large factories in Barcelona there are two large continuous furnaces (Hoffmann system); in another they bake their tiles in square ovens where fire is used intermittently. Both factories use hard coal for fuel. An important industry, not so much on account of the number of usages to which they are dedicated as for the great number manufactured, is the making of glazed bricks for kitchens, the shape and condition of which in Spanish cities is well known to consist in a number of small iron furnaces or grates, at a certain height from the floor, set in masonry, to cover which the above mentioned bricks are used. These, the manufacture of which is almost exclusively confined to Catalonia, are used throughout Spain, the Philippine Islands, and the Spanish col-

onies in America. In mosaics there are two distinct kinds, both used as flooring, one of which, the older, is obtained by the juxtaposition of numerous pieces of geometrical shape, and each of a different color. The inconvenience of this kind of flooring consists in the difficulty in making surfaces perfectly smooth on account of the different thickness of the pieces, and the fact that as soon as one piece is out of place the whole flooring requires resetting. Nevertheless, at one time the manufacture of this kind of mosaic was at a great height, and constituted an important industry. The difficulties already mentioned, and the restriction which the geometrical shapes of the pieces imposed upon the general design, have given rise to the manufacture in modern times of incrustated mosaics. In this, as in its sister industry, natural clays are used, preference being given to those with a large quantity of alumina, on account of the great heat of the ovens heated by hard coal. The colors are produced by various metallic oxides mixed in proper proportions. In the manufacture of simple mosaics the several moulded pieces are obtained by means of pressure stamps, the matrices of which have the geometrical shapes to be given to the pieces. The baking is done inside boxes or cases of fire clay, in ovens of only one laboratory and one or more fireplaces. In the manufacture of incrustated mosaics all kinds of designs are obtained with the same clays used in simple mosaics, the difference consisting in the moulding, which, as in the previous case, is performed by pressure, but with larger machines, the dimensions of the pieces being larger. The shape is always square, with sides of $2\frac{1}{2}$ inches or more. The designs are obtained by placing slips of tin within the stamp matrices, and each one of the intermediate spaces formed being filled with the different clays previously colored. The designs thus obtained, the slips of tin are removed, and the whole rendered compact by pressure.

MINERAL PRODUCTS.

The following table is compiled from the sixth report of the Mineral Resources of the United States, by David T. Day, chief of Mining Statistics, etc. It relates to the products of 1888.

Pig Iron.....	6,489,738	tons	Value	\$107,000,000
Gold.....	1,604,927	oz.	"	33,175,000
Silver.....	45,787,632	"	Coin value	59,195,000
Copper.....	115,635	tons	Value	33,833,954
Lead.....	180,555	"	"	10,680,000
Zinc.....	55,903	"	"	4,782,300
Quicksilver.....	132,118	"	"	1,413,125
Nickel.....	195,182	lbs.	"	115,518
Aluminum.....	3,000	"	"	13,500
Al. Bronze.....	18,000	"	Value not given	
Petroleum.....	27,346,018	bbls	Value	\$ 24,598,559
Coal.....	142,037,735	tons	"	\$204,221,990
Salt.....	8,055,881	bbls	"	4,337,204

CORRESPONDENCE.

THESE COLUMNS ARE OPEN TO ALL. THE FULL NAME AND ADDRESS IS REQUIRED BUT WILL NOT BE PUBLISHED EXCEPT WHEN PERMISSION IS GIVEN BY CORRESPONDENT. THOSE DESIRING TO COMMUNICATE PRIVATELY WITH ANY CORRESPONDENT WHOSE FULL NAME IS NOT GIVEN CAN DO SO BY ADDRESSING LETTERS CARE OF CLAY-WORKER.

Coal and Its Value as a Fuel in Brick Burning.

Editor Clay Worker:

What has been said in a subsequent article in regard to the difference in value of wood is applicable also to coal.

The coal measures are distributed over a large area of the inhabited part of the earth's surface. And any part that is inhabited by civilized peoples, in the alluvial districts which is void of coal is still largely dependent upon coal for some of its uses, in the arts and manufactures.

It is found upon analysis, and more clearly by practical tests, that coal varies very much in its constituents, and as a heat producer.

The coals, classed in market as Muskingum Valley coal, Brier Hill coal or Pittsburgh coal, has no uniformity of grade; and varies from good to bad in different mines, of the several districts. And so it is through all the different coal measures of the different states and sections.

Geologists teach us, that the brown coals or lignite, are examples of imperfect coal or what is termed coal of recent formation.

This is loose in texture, soft, dirty and produces a low heat with a large proportion of ash and refuse.

The bituminous coal fields of most sections, have some mines that approach this quality of coal; particularly where the coal lies near the surface, or crops out on hillsides, or in ravines or bottoms of streams; that which lies deeper in the earth being more pure or perfect coal.

In this grade of pure or perfect coal the combustible matter is part fixed and part volatile.

When the combustible matter contains from 90 to 95 per cent. fixed carbon, it is called anthracite coal.

If it contains from 80 to 85 per cent. fixed carbon and 15 to 20 per cent. volatile matter, it is called semi-anthracite, or semi-bituminous coal, of various grades.

If the volatile matter rises to the proportion of 30 or 40 per cent. it becomes full bituminous coal, which always burns with a strong clear flame, and will cake over, or melt together into a mass and when the flame has passed off will burn

as coke with an intense white heat, melting the solid ash into a cinder or clinker.

If the coal approaches, or exceeds 50 per cent. of volatile matter, it is highly bituminous fat, or fusing coal, and is well adapted to the manufacture of coke, gas, oil, etc.

Now after careful comparison of different coals, it is evident there must be a great difference in results, in brick burning in using the different varieties of coal.

I am frequently asked: "How much coal does it take to burn a thousand brick by your method?" Now that is a question that I will answer, and do it as near correct, as the man who will tell me how much milk a cow gives, or how much does a lump of chalk weigh?

I have frequently been interviewed by men who are interested in railroads as master mechanics, roadmasters, engineers (C. E.), etc., and they also had a smattering knowledge of, and controlling interest in a brick yard.

These men had their locomotives to do a stated amount of work in a certain length of time, with a regular allowance of coal. All, figured out and tabulated, by rules and problems in engineering and physics. And they did not hesitate to tell, that a man who could not tell how much coal it took to burn a thousand brick was not fully up to the head in his class as a brick burner.

This article is to answer that class of brickmakers. When an engineer is confined strictly to one grade of fuel, each engineer his own engine, and one route of travel regularly and his load never exceeds a certain number of loaded cars, he can then tell very nearly how much coal will be needed to make the trip.

But with the poor brick burner the case is an entirely different one. He has no means of knowing how much moisture has to be expelled from his green brick before they are burned.

Sometimes his fuel is from one mine which is a free burning fat coal and again it is from another mine which is dirty, full of slate and sulphur, and altogether is a poor fuel.

At one time his fuel is all slack or coal refuse, and another time it is all nut coal of fair quality, or during a scarcity of this grade he has run of mine.

In my own case, I have had the best coal to raise heat immediately after the watersmoke was off, and then be compelled to use a poor quality of coal dust, with a settling heat and finish. Our engineer will say: "Why do you have it so?"—"Why don't you use a uniform

quality of coal?" Well, I answer that I have found, that railroads, and brick yards, are of a necessity compelled to run business in two entirely different channels. The financial standing of the two is so wide apart, they can't be run together on the same rules and principles.

And again it is a conceded fact that clays vary in their refractory properties. So that the man who burns fire brick will use $1\frac{1}{4}$ tons of coal to the thousand; while on the yard next to him, where common red brick are burned, the same amount of coal will burn four or five thousand brick. And all brickmakers of experience who are up to their business know that their clay will vary in the bank and in many cases must be mined, mixed piled, and mixed again in proportional amounts from different parts of the pit to secure a uniform grade of burned brick. This argument is to show that there is no exact rule, and can be none, for pounds of coal or wood to the thousand of burned brick.

And there are also various other reasons that can be assigned which will always remain among the undemonstrable problems of brick burning.

Block coal as it is mined comes to market in large lumps partaking the nature or appearance of slate, that can be split into slabs or sections, and is not liable to fall to pieces in handling, while it is a free burning fuel it leaves a large quantity of loose light-colored ashes; and on account of its large size and hardness in breaking, it is not desirable as a fuel for brick burning.

Coal that is used for burning brick should be of a small size so as to scatter evenly over the grate bars and begin to make heat rapidly.

Block or lump coal can be used in its coarse condition as mined, in blast furnace work; but for brick burning, the best success is attained with nut coal and coarse grades of slack or coal screenings.

The experience of the writer is that the very best coal to produce heat, with freedom from excessive clinker, a low per cent. of sulphur, or slate, is that from the mines of East Tennessee.

While there are other sections that produce a good quality of bituminous coal, that may be equally as good or even better, our observation among the coals of Northern Ohio, Western Pennsylvania, Indiana, Illinois, Missouri, Virginia, Alabama, Georgia and Tennessee, goes to prove, that all things considered we give it precedence over the others.

The Virginia coal mined on the line

of the Norfolk & Western Railroad and classed as Pocahontas coal, is a bright, glassy, bituminous coal; or as some call it, semi-bituminous. This coal is of a free burning nature, but is not productive of much flame, rather too much sulphur, and makes a large amount of heavy clinkers. The lumps of coal are readily shivered or knocked to pieces with a light blow of a hammer.

The one great fault of a coal of this kind is, it breaks up too fine; and when "fired" the fuel lies so close on the grate bars as to virtually close all draft through them. This is one cause of its liability to clinker; the heat goes over the top of the mass, or for lack of draft, is held in the furnace causing a melting together of half burned coals, which cool on the dark ashes below.

This coal is so fine and free in parting into dust, that when shoveled into a superheated furnace, the particles will ignite with a flash like powder; and cause a rebound of the flame at each shovelfull three or four feet outside of the furnace door.

While it is not the intention to write up the coal of any locality, or deprecate another, but merely to compare the value of the different kinds of coal, and show that manufacturers of brick and clay wares, have a different problem before them than the man who uses coal to raise steam in his boiler, or to make heat for domestic use or any other of the uses to which coal is applied. Take for instance, the anthracite coal of Pennsylvania, and for cleanliness, evenness in burning, lasting qualities, freedom from sulphur or any other deleterious substance, and for domestic use, it can scarcely be excelled as a fuel; certainly not for cheapness and unlimited quantity. But we must question its use as a fuel in brick burning; for the reason that it has but little flame and is virtually slower of draft, consuming more time to burn. Again it is of a smooth or slick nature, which is enhanced when brought to a red heat, and has no coherence one particle to another; which allows it to part with all of its fine coal, by slipping through very fine grate bars into the ash pit, thereby causing waste; while bituminous coal will part with its tar or oily components and cause it to expand and cake over the grate bars. And can then be rustled up with the firing iron, while the flame carries the heat high up in the kiln, and cause hard brick to be burned at the top or near the platting courses. In burning brick with coal it

is always best to drive off all the moisture first with wood or coke, before putting on the coal fire; there being a tendency in most kinds of bituminous coal to produce a large amount of heavy smoke and soot, that clings to the damp brick at the top part of the kiln, and retards the draft, or as the brick burners say, "chokes the kiln," and can only be driven off by long continued firing with coal, or what is quicker and a better plan in such a case, is to stop firing with coal and fire with wood until the red heat is well up in the kiln and shows all over the top.

Coal has the reputation of burning the brick a darker color than wood fires; this may be true. But my belief is that coal furnishes a steadier heat, and where coal is used, there is a better provision for brick burning, control of fires, less of cold air admitted among the heated burning bricks; and as a result the bricks are more uniform in color, are not blued or shaded by cold air drafts, and have their true color. This is more marked in the improved kilns of modern design than in the old style clamp walls.

An opinion prevails among a great many brickmakers that coal cannot be used for burning brick without grate bars and furnaces, and they go on from year to year using wood alone at a high price in the sections where coal is abundant and cheap. We will give our observation and experience in the matter which can easily be verified.

When you desire to burn brick in part with coal, you begin first by setting your arches twelve inches wide, three-and-a-third brick bench, set nine courses high, with four overhanging courses. This makes the arch high enough to build two fire holes to each arch at each end of the arch.

First, build the lower one outside three bricks in length, four courses high, and arch them over, on top of these arches or fire holes lay any heavy iron bar. An old railroad iron is about as easily procured and suitable as can be had, laid next to the kiln, and crossing all the arches. This bar serves as a bearing for cord wood to lean on when firing.

Now level up on top of the arches and fill in carefully between all the buttresses, and then another arch immediately over the one below, and of the same size.

In watersmoking the kiln, fire altogether in the lower arches, next to heads, and as the kiln gets dry and hot, fire in the upper arches, with wood only. Then when you have draft enough in the kiln

to burn freely, slide in two sticks of wood in each arch letting the ends rest on the iron bar, on top of this wood shovel in coal until the upper arch is closed and the draft through the lower arch will cause the coal to burn free.

The lower fire hole or arch must be kept clear and bright clinkers pulled out, and all draft through a bed of free burning coals.

At each recurring fire, shove in the coal in upper arch with the two sticks of wood, then fire coal on top of them as before.

When it is necessary the arches can be fired by sliding wood to the center as in any old style kiln.

In this way a good heat can be produced and the fuel bill very much shortened. Lump coal or run of mine is the kind to use, as coal that is fine requires grate bars.

While there is some advantage in this method over wood alone, where coal is plenty and cheap, we do not desire to be understood as especially recommending it. Our preference is unmistakably for permanent kiln walls and furnaces.

Where kilns are properly constructed and managed, and three arches are burned with one fire, there is a great saving in labor, fuel, and wastage of brick; permanent kilns are plenty enough at this day so there is no controverting the fact. And they are designed to burn wood, coal, gas, or oil, according to your locality. Brix.

Burning Dry Press Brick.

Editor Clay-Worker:

You ask for a letter on dry press burning. Well, from my experience, I would rather undertake to get a really good kiln of brick made by the dry press process than in any other way. The watersmoking must be done much slower, in fact one ought not to be able to see the smoke coming off the kiln. Never have more than seven small sticks of wood in each fire hole and those burning slowly. The fire ought not to be kept up continuously the first five or six days and if the bricks are very damp when they go to the kiln I would advise one to burn 12 hours then close up kiln 12 hours alternately, say, seven or eight days. Then get heat up (after watersmoke is all gone) very slowly. After that a man who can burn a good kiln of any other kind can burn dry press brick. The last kiln I burned was a common case kiln and I venture it was as good an

average as nine out of ten of the new patent kilns.

Another method of burning which I think will be of great advantage in places where wood is getting scarce, is by using screened bituminous coal, making small flues at the bottom of the kiln in which is placed wood and bituminous coal. This is merely to set the other coal on fire. Then lay the brick together and put a layer of small dust coal between each layer of brick. Then set the kiln as large as you like or as small, I have burned 10,000 in one and as many as 1,000,000 in the other. The amount of fuel, is small and the breakage in burning is small, you get a better and more even burn without the trouble of burning after setting fire to your bottom flues. That ends the matter except if the wind blows hard you must put up some shelter. However, this manner of burning will only do for mud or slip brick. Sometimes there is a clay that, if made by wire cut machines, will stand the fire. The brick have to be very dry before setting.

THOMAS PARKER.

New York News.

Editor Clay-Worker:

It would take almost a full page of the Clay-Worker to go into details regarding the fluctuation in the brick market here since my last writing. There has been an enormous demand almost the entire time, and building has been quite lively. At the beginning of June prices were very low owing to the fast production. At the time of the Centennial there was the worst glut that the market had seen since last year and prices were very low. When that was worked off, shipments were modulated by the manufacturers and prices advanced almost 75 cents on all hard grades.

The brickmakers began to chip on the advance at once, and boat load after boat load went down the river. As the fourth of July approached, buyers, anticipating a short supply immediately thereafter, bought largely in excess of their immediate wants. The supply, however, continued full, and this caused another small glut and a decline in value of 25 cents. At the present writing the accumulation has been worked off, and there is every prospect of the old business being re-established—the supply being regulated to the demand. The rainy weather has interfered very materially with the output of brick and it is probable that a very large shortage will be the result.

The craze for erecting monster office buildings in this city has not abated, but in the composition of most of those going up brick only enters for the inside walls; the exterior as a rule being of limestone granite, brown stone and other materials. The new building at the corner of 14th Street and Union Square now being erected, is to be nine stories high. The first four will be of Indiana limestone, the three above of brick and the two top stories of terra cotta. The cost will be \$250,000. On the corner of Broadway and 32nd Street a nine story hotel is going up the front of which will be of marble, buff brick and light terra cotta. This will cost \$500,000. The Children's Aid Society has filed plans for the erection of a four story brick and stone school house in 73rd Street near 1st Avenue to cost \$64,000. These few items only give a glimpse of the work that is going on. The daily papers fairly teem with reports of flats, office and club buildings, churches, synagogues and schools that are going up on every side, and the prospects are that this will be a decidedly lively summer and autumn for builders.

On the 5th of July the books of the Building Department were closed for the first six months of the year. The figures showed that up to the present time this has been one of the most prosperous years that builders in the metropolis have ever had. Although the number of buildings going up on the West Side of the city is not as large as during the great boom in real estate in 1887, the value of the building is equal in every way. In 1887 dwelling houses were erected, this year it is office buildings, business houses and expensive flats, almost all of which are below 59th Street. The boom two years ago was far above that locality.

A riot broke out on June 23d between the Hungarians and negroes employed in James A. De Groots' brick yard at Albertson's Cut, a little hamlet on the Hudson, in which two of the Hungarians were killed and ten others seriously injured. The assailants of the dead men have been held to await the action of the Grand Jury.

BRIC-A-BRAC.

An Observation.

Editor Clay-Worker:

While here I noticed a Dryer in the yards of the Yankton (Dak.) Pressed Brick Co., which seems to contain several features to commend it to brickmakers making from 20,000 to 25,000 brick per day. This Dryer consists of two wide

tunnels 14 feet wide inside and 80 feet long. The heating apparatus is arranged on the Iron Clad System with the vapor stack at the opposite end. The new feature in this Dryer is that no rails or cars are used. A portable hake or truck is used for carrying the pallets through the Dryer. The system is very simple and inexpensive and seems to work admirably. Parties interested in brick dryers should go and see this in operation, as the cost is about half that of brick dryers as ordinarily constructed.

The Economy Portable Brick Hake in use on this yard and which is manufactured by the Yankton Pressed Brick Co., is an admirable device for handling soft or stiff clay brick.

A PILGRIM.

The Village Brickyard.

Editor Clay-Worker:

Some notes on enamelling brick (continued):

In July Clay-Worker an outline was given of some experiments as to the possibility of introducing fancy glaze work into the Village-yard by way of the old-fashioned open top kiln.

The following samples were set 14 bricks from the bottom and are estimated to have received 2200 degrees of heat being subjected to more than usual on account of a flue or split in the kiln. Each ingredient was mixed to a thick paste with water, being ground fine in a porcelain mortar and then applied by a brush to the brick surface.

Feldspar.—Partially fused fast to the surface—slight gloss—balance of the material like whitewash and will rub off.

Kaolin.—Dried only and coat can be entirely removed by washing in water.

Boric Acid.—Fused into surface giving slight gloss and changing color to steel red.

Bone Ash.—Whitewashed and removable by washing.

Oxide of Zinc.—Fused into surface, giving no gloss but changing color to buff yellow.

Oxide of Manganese.—Fused into surface, giving blue black steel gloss.

Red Lead.—Fused into surface, giving brownish black lustre.

Carbonate Lead.—Fused on surface, giving grayish black gloss of very desirable color.

Carbonate Soda.—Absorbed in the brick with slightly darker addition to the surface color.

Gray Oxide Tin. } Whitewashed and
White Oxide Tin. } readily removable by washing in water.

These are among the most prominent materials available and various combinations may be arranged that will show good results in our kilns. For instance:

Glaze No. 12—Carbonate lead 33 parts, feldspar 11 parts and flint 6 parts will produce a smooth gloss if set about the middle of the kiln—of a rich, creamy-brown color; it being essential to success that the various conditions of failure named in a previous article, be carefully guarded against—also,

Glaze No. 2—Feldspar 8, flint 7, carbonate lead 7, oxide zinc 5, boracic acid 5, kaolin 2, thoroughly and finely ground and fired in the hottest part of the kiln will produce a satisfactory white enamel. A number of others might be named but as most of them require to be burned and then reground to reach good results perhaps the above are illustrations sufficient.

While the knowledge gained by looking into this subject has been of great pleasure to the writer, the conclusions has never-the-less been fairly arrived at; that it would be unprofitable to attempt to enamel brick on a commercial scale in the way herewith suggested. The interference with regular brick work by using the best part of the kiln for such a purpose and the long time necessary to accumulate stock often wanted at a short notice are subjects that must be considered in this connection.

VILLAGE BRICKMAKER

Notes From Beyond the Rockies.

Editor Clay-Worker:

In regard to the clay working interests of the Pacific coast we will say that everything in that line here is completely overdone. According to the demand either in common brick, pressed brick or fire brick, as well as in sewer and water pipe, and in fact anything in the clay line except terra cotta lumber, which is not manufactured on this coast at present. Sawdust being scarce cut straw would have to be used. There is any quantity of clays for such a purpose, but fuel is scarce and high, and the main drawback.

There are now three vitrified clay sewer and water pipe works in Southern California and three large and one small works in Northern California and business enough for only about one-half as many factories. In boom times there would have been business for all, but there were only one-half as many factories and they located in the northern part of the state, made pipe very high in this part, therefore factories sprung up and

the business was at once overdone. The boom bubble burst and the great demand for water pipe stopped and now there are more factories than business.

I hardly think at present writing that any clay working establishment in this part of the state is any more than paying expenses, if that; but the time is not far distant when we hope for much more business. The demand for building material is small at present and will be for some time to come. Fuel in Southern California is the main drawback and costs five times as much as in most Eastern States, especially the Middle States.

C. B. H.

South Riverside, Cal.

What's The Trouble.

Editor Clay-Worker:

I read the Clay-Worker with much pleasure and profit and now come for information. We are making brick by the semi-dry process from shale the analysis of which appeared in the June '89 Clay-Worker, page 394. The bricks burn a very good red inside but the outside is covered with a gray whitish skim, very thin, but spoils the appearance of the brick and prohibits their use for facing purposes. In every other respect the brick are very good. What is the cause of our trouble? If any of your readers can tell us and suggest a remedy we will be very grateful. We want a red face brick bad in this immediate district end if we can get rid of this skim we will have it.

R. S. BLUCK.

Petersborough, England.

NOTES BY J. W. CRARY, SR., ON WRITERS IN THE CLAY-WORKER.

Prof. R. T. Brown has, in the April No. a very intelligent and able document on the peculiar properties of clay, but like all scientists, philosophers and reasoners, the Professor begins at the second cause. No amount of recondite disquisition can ever unveil the first cause. To say that clay is decomposed feldspar and then, that feldspar is crystallized silicate of alumina, is mere abstraction, but it is, nevertheless, an intelligent way to put it and gives us the same as to say, diamond is crystallized carbon and that crystallized carbon decomposed by fire is diamond dust; that bread is decomposed gluten or starch and that gluten is uncooked bread. We can give names to things as they form and transform, but the mystery of their changes remain the same, perfectly unsolvable and inscrutable problems in the millions of the mysteries of God.

Prof. Brown says: "When feldspar loses its crystalline form by exposure to atmospheric agencies, it appropriates two equivalents of water which gives it the form of an hydrated compound. On the presence of this water of hydration depends the plastic property of clay which gives it its chief value. Chemists have doubted whether this water was chemically united with the compound or merely held by the powerful absorbent property of the alumina." Then the Professor most conclusively answers the query by saying, "But if this was the nature of its union, it would be liberated in the form of steam at a temperature above the boiling point." Then he adds the profound, unfathomable mystery, "but it requires a temperature above a red heat to liberate it and when once driven off can never be restored." I have dug clay from decomposing feldspar until the solid rock was reached and although the crystallized clay looked as dry as any brick; the decomposed part though not exposed to water was quite damp and plastic. I could no more understand this than I could see just how God made Adam, but I came to the conclusion that it was water and "dust of the ground" mysteriously, or chemically if you please, combined. The hydration of alumina is its "breath of life," the anhydration is its death.

The Professor well says: "The complete removal of this water of hydration is the condition upon which the durability of all clay work depends." Then he makes a mistake (I don't blame him, for as I have shown in one of my former articles how I made the same mistake) by saying "the loss of this water is the measure of shrinkage observed in the setting of a kiln when it is sufficiently burned. An expert burner measures the completeness and uniformity of his burn by the extent and evenness of this sinking though he may not know why the surface sinks at all." Here the Professor verifies the old adage "practice makes perfect." Scientists know the road just as far as they have traveled, not one inch further. The great part of all primitive clay, silicate of alumina, such as comes from the decomposition of crystalline substances, is infusible and will become anhydrous by intense heat and will not shrink a particle, and where the silica is in great excess of the alumina in combination and no flux is present, it will swell a little when very hard burned. Such are our clays generally on our southern sea-coasts, or anywhere else where there is absence of flux or anything to vitrify or fuse alumina.

Prof. Brown is one of your best and most able contributors.



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PRO AND CON.

It is quite well understood among
journalists that the publication of cor-
respondence or papers upon any subject
in our line does not necessarily involve
our endorsement of them. The views of
the writers may be antagonistic to those
held by us on the same subject, yet we
give them place in order that our readers
may investigate subjects that may be of
interest from different standpoints.

Indeed it frequently happens that the
views of some contributor may, in our
judgment, be fallacious, and at the same
time serve a good purpose in drawing
out of others a better solution of the
question than has hitherto been presented
to the thinking public.

It is said of Abraham Lincoln, that he
invited in every way possible the consid-
eration of important questions from op-
posite standpoints, so as to arrive at the
right conclusion himself.

If one of our contributors should claim
that a certain machine makes the best
paving brick, we understand him to say
so from his standpoint, and our readers
should so understand it. He may be
wrong, and if wrong, some one will know
it, and if it is understood that our col-
umns are open to a free lance, they will
say so, and tell us why they think so.
And this free discussion will lead to a
better understanding of any and all sub-
jects.

A correspondent may be wide of the
mark in his statements and views, and
in some instances misleading, yet the
importance of the subject in our judg-

ment may lead us to give space to its
consideration in order that others may
feel called upon to refute them and in
so doing help others to form correct
opinions.

It may be said that our correspondent
"A" is not fully informed on the subject
which he attempts to treat—that may be,
if so, some of our readers will find him
out, and let the craft know it. Or it may
be said of another, he lacks experience;
very well, turn on the light and show
him up, he will likely thank you for it.

We want it distinctly understood that
our columns are open to the free and
full discussion of all questions pertaining
to the craft. Two things we ask—the
first is, that you must not hold us re-
sponsible for the views of others, and
secondly, that the interests of all must
be respected. And we promise on our
part to see that some other fellow turns
the grindstone when axes are to be
ground free of charge.

PAVING BRICK.

At this time there is much interest
manifested in the use of brick for paving
streets. It is a move in the right direc-
tion, and the merits of paving brick
should be fully investigated. We believe
that they will stand the most crucial
tests provided good pavers are used. To
use only the best is the important point
in the introduction of this method of
improving streets. If the material is
good the results will be highly satisfac-
tory, if the material is poor the use of
brick for this purpose will be looked
upon unfavorably where the poor mater-
ial is used.

It is not our purpose in this brief
notice to say what kinds of clay or what
method or methods of manufacture is
necessary to produce the best paving
brick, but rather to caution against the
use of imperfect material. The interests
of those that manufacture or who may
in the future engage in the manufacture
of street pavers, will be best served by
the use of only the best brick for this
purpose.

A little enterprise is also needful to
further the introduction of brick pave-
ments. Let those who can make a con-
ditional contract with their town or city
authorities to lay a square or more of
brick pavement on a prominent street,
arranging with the city to pay for the same
after a given length of time provided it
proves satisfactory to the traveling public
and those who are intrusted with the
responsibility of such improvement.

Then do the work well, use only the best
material, and the work of introducing
brick for paving streets will be well on
the way.

When only the best material is used
and the character of the work done is
good there is not a better material for
paving streets at the same cost known
than paving brick.

USE OF PRESSED BRICK.

There is a brick house in process of
construction on B— street. The owner
has been at the expense of providing a
substantial foundation, and the building
when complete will cost \$6,000; and
would be a much more imposing struc-
ture if the use of pressed brick in the
front walls had been required. As it is,
the front has a rough uneven appearance.
The passers-by having taste in such
matters are led to exclaim, "Why didn't
they use pressed brick? The difference
in the cost would be only a few dollars
and the appearance would be greatly
improved."

Such mistakes will occur but their
recurrence will be lessened. We would
hardly think of erecting a brick edifice
of any cost worth naming without pro-
viding for the use of plain pressed and
ornamental pressed brick, to be in accord
with our own and the educated taste of
others. In addition great care should
be taken to have the color of outside
walls uniform. The day for rugged,
streaked and striped walls is past, and
we hope that few edifices erected for
homes will in the future neglect the use
of ornamental brick and terra cotta.

KEEP TO THE FRONT.

There is a progressive spirit among
the leading manufacturers of clay goods
—better goods—at less cost—more artis-
tic designs—an increased demand for
harmony of colors, etc. Some who have
not kept step to the music of modern
progress and are still in the old grooves
may think that others are running after
strange gods. But there is a demand for
the better goods and the demand is in-
creasing and will continue to increase,
and those who keep to the front will see
to it that so far as they can, every want
in this direction shall be gratified. The
truth is, that there are, in the lead, a
number of enterprising business men
who anticipate these wants in advance,
aye, more—create the want by furnishing
goods so beautiful in design and so ad-
mirably adapted to the use intended
that they meet with ready sale on sight.

The old and rough methods, and utter disregard of cultivated taste will not win. Such manufacturers go to the rear. To succeed, we must keep to the front, and get there on time.

THINGS COMMENDABLE AND OTHERWISE.

We have it in mind to say a few things in a very plain way that may apply in part to those who are in the field as manufacturers of clay working machinery, or who have valuable devices otherwise intended to be introduced and used by the clay working industries.

We refer to the various methods of doing business, even among those who take the lead in business enterprises.

There are those who are painstaking in the manufacture of their goods, advertise them in the trade papers devoted to their interest, carefully attend to their correspondence, have but one price for time sales and one for cash, fill their orders promptly and vigilantly strive to make good every promise, without cavelling about it.

But the business man who stops at this, neglects an important feature that is needful to secure the most gratifying success, and that is the little business courtesies that should sweeten the business life—thanks for “your favor,” “your order,” “your prompt payment,” for “your good word,” etc. Then follow up the goods sold with inquiries about their use, and if there are little difficulties, make timely suggestions to overcome them. In this way it is not only possible to build up a large trade with good goods but in addition, make a host of friends—friends that will commend both the goods and the maker to others. All of this is commendable—and more, it is profitable.

There are those, who are men of good intentions, have some push in a business way, but are careless in many ways—careless in correspondence, in filling orders, causing unnecessary delay and expense to their customers and in many ways annoy their trade, though intending well.

Another class depend too largely upon booming their trade upon claims that those patronizing them are not expected to realize, only in exceptional cases, and these cases are paraded before the public, to extend the trade. But there will come to such a trade method a falling off, and a falling out, for such methods will make few friends and many enemies.

Another class make a show of business

method. In the beginning, they advertise in the trade journals, push their trade, indeed “boom it” as they say, but their great effort is to get a settlement for the goods sold, and after that the goods and those that bought them are rudely thrust aside, and new fields and new victims are sought for.

To illustrate more particularly: By one way and another they secure the names of parties, send them special offers, and hire the influence of other parties to aid in doing in an underhand way what they cannot do openly. But in all cases they are persistent in securing a settlement in advance of a fair trial of the representations that have been made. The day of reckoning comes to this method of driving a trade—it must and will fail.

Another method of making the trade “go,” is to refuse to advertise in trade papers, but rather secure some one or more shrewd agents to drop down in a business centre, stop at the best hotel, inquire for the men of capital, and “work” up in various ways a “business enterprise,” as it is called—find some venal man who has a local moneyed reputation, to influence others to organize a huge stock company—talk up the “machine,” take a part of the stock, put in the machine at enormous figures, start things going, sell out the stock at a discount and seek new fields and pastures green. They never advertise, oh, no; they don’t do a small business. If they did advertise they would soon become known and that would defeat their method of doing business. We could name a number of enterprises that have cost local capitalists a mint of money and much wear of mind—and the throwing out of the “machine” and the putting of the enterprise upon a very different basis to that intended when it was “worked up.”

Stock companies and large enterprises are well enough if organized in a legitimate way, but beware of the men who are quietly in the field talking up the “machine”—a sharper “cheek by jowl” with some local sharper “working” up a “business enterprise,” and who does not want to be known or have his machine known to the trade except locally where his sweet will has it in mind to confer a lasting advantage to the very few that he is disposed to take into a “great business enterprise,” as he denominates it. Such methods are not commendable—in fact are swindles.

The men to be trusted, patronized and commended, are those who are prompt

and fair in all their business methods, who advertise in their own trade papers, who are content to put their claims fairly before the trade and then make for themselves a reputation by making good their representations and besides make for themselves a host of friends by observing the little business courtesies that make it pleasant for business men to do business with courteous business men.

THE FUEL QUESTION.

It is currently reported that an English syndicate is visiting the large cities of this country with the view of establishing plants for the manufacture of fuel gas, which it is said, they will be able to furnish to consumers at 25 cents per thousand feet. The fuel question at this time is commanding special attention. The discovery of natural gas in such quantities as to indicate an almost inexhaustible supply in the future, has encouraged many manufacturing interests to locate in what is known as the natural gas area. With fuel practically free, they are able to compete with rival interests in other localities in the reduction of the price of their products so as to threaten the future of what has been heretofore, prosperous manufacturing establishments. As long as all were practically upon the same footing in the cost of production the trade was in no danger. The fuel consumed was one of the important items in the bill of expense. To have all necessary fuel free is a saving in many lines of manufacture sufficient to enable the manufacturer to realize a satisfactory profit if the goods should be sold at their actual cost of manufacture by other establishments where the common fuels are used, such as wood and coal.

Many large interests cannot be removed, but they must compete with those who have the advantages of natural gas, hence they must have a cheaper fuel. The use of crude oil is being introduced successfully. With oil, brick manufacturers have been able to burn brick at a cost of 40 cents per thousand and the end in the reduction of cost is not yet. Now comes those who propose to furnish fuel gas manufactured from coal at a cost of 25 cents per thousand feet. It is claimed that it is a saving in the consumption of coal of more than 70 per cent. to those who may own their own fuel. The present consumption of coal with the common methods of combustion involves a great loss of heat. This is apparent to all who have had any experience in this

direction. In the use of fuel gas the heat is utilized to an extent that practically reduces the waste to a minimum.

However, the manufacture of fuel gas is being conducted successfully by several large manufacturing interests under patents granted in this country. The inventive genius of the age, especially in this country, is so fully on the alert that we never know when the end of further improvement in any device has come. Possibly within twelve months, further discoveries will by far excel those in use. This is true of machinery. An inventor may patent a device which he judges to be perfect and demand for its use a large sum and refuse to accept a handsome compensation for his labor, mentally and otherwise, believing that he can and will control it and command his own price for it. In his fancied security he awakes some morning to find that another has patented a device for doing what his did and more by a different and more simple process. So we confidently predict that the end is not yet in the reduction of the cost of fuel.

There are tile and brick interests, many of them, perhaps, that would find it a great saving to put in a plant for the manufacture of fuel gas and they will at no distant day. The time has come in the history of manufacturing interests when they cannot afford to ignore these important economic questions.

ANGLING AND ADVERTISING.

Advertising has some features resembling others in fishing. In the latter occupation no definite rules can be given, as the circumstances under which fish are caught are as varied as the tales which find willing ears upon marines. But one instance is recorded of fishing by rule, in the case of a learned professor, who was persuaded one time to leave his books and his manuscript to show up his character as an angler. He had been carefully instructed as to bait, and how to drop his line in the water, and to watch the bob. Of a sudden the bob disappeared like a shot, and the professor, turning to his instructor, said: "Do not let me interrupt you, my dear boy, but in case the bob disappears, what do you suggest as the next feasible movement on my part?"

If, however, there be left out of consideration the matters of preparation, attention, patience, all of which are equally required in any calling or occupation, there is one prime qualification for a

successful angler, whether he be a fisherman or a fisher of men, and that is, "knack." Here are two anglers, side by side; one is supplied with richly wrought bamboo pole, silver reel, silken line, fly-hook of most improved pattern; his sporting suit is English, you understand, and his tourist helmet gives him quite an air *distingue*, and withal he fishes with the air of an expert; but the fish don't bite. Following him is a lad, shock-headed, straw hat, crown gone, with just enough clothes on to "wad" a gun, and handling a pole cut from a bush in the woods. His fish line has many colors and more knots, his hook is not the sharpest, but watch him. The bob is floating quietly on the surface of the water, and balancing himself at the end of a bough overhanging the stream, he is almost dozing. A commotion of the water around the bob drives away that drowsiness instantaneously; slowly he raises his pole until his line is nearly taut, and then with the disappearance of the bob, he pulls slowly, and more and more rapidly, until he lands his game, and sizes up the modern sportsman with a leer, as he re-baits, spits on it, and takes his stand for more game.

Now the features wherein advertising has parallelisms with angling are all embraced in the word "knack." The advertiser, in the first place, must know there is business where he goes, just as the angler knows there is fish where he throws his line. And very often this has to be tried. Then it is necessary to know what is the best inducement to attract the prospective customer, and not only to attract, but to persuade him to buy. Just as the angler must know the best bait, and how to serve it. And then there must be experience; that is, one has to learn the knack.

Experience has taught that practice makes proficient in anything and everything. It's so in angling, so in advertising. That jolly fisherman—he hasn't been long at it—you can tell that—with his feet spread out, his arms grasping his fish pole, and body erect, he is watching the red and white painted cork as it bobs up and down; now the bob disappears, and with a jerk that ought to have straightened out the most crookedly barbed hook, he lands his line in the branches of the nearest tree, not only without a fish, but his bait gone, and travels elsewhere.

So there are advertisers who are continuously moving about. They have not learned the knack of placing their adver-

tisement in an effective manner. The requisites which are generally observed are to know the goods, who will want them, and the quickest and most economic way of reaching their buyers. Having become satisfied as to these points, the extent of the "ad" is determined, and that is wholly a matter of judgment and experience.

There's a difference between scooping for minnows and harpooning for whales; in snipe shooting and "loading for b'ar;" but it often happens that in advertising a small card will do the work of a full page. This is, however, the exception, not the rule. A study of the subject will show that the longer an advertiser is seen, the larger is his card.—*Ex.*

WHITE ON BRICKS.

The white spots which so often appear on brick work are a frequent subject of inquiry as to their cause and remedy. Samuel Cabot, of 70 Kilby street, Boston, writes on this subject as follows:

The cause of this has been recently investigated by the writer with the following results: There are at least three different substances which cause this. Of these, carbonate of soda is most common upon new work, after the lime stains have been removed. This is due to the action of the lime mortar upon the silicate of soda in the bricks. Silicate of soda seldom occurs in bricks unless the clay used is a salt clay.

The only other white efflorescence in importance is chiefly composed of sulphate of magnesia. This is due to pyrites in the clay which, when burned, gives rise to sulphuric acid, and the latter unites with the magnesia in the lime mortar.

The above are the results of actual examinations by the writer. The conclusions thus far arrived at are these:

1. The "efflorescence" is never due to the bricks alone, and seldom to the lime alone.
2. To avoid it the bricks should be covered with an oily preservative capable of keeping the salts from exuding. Linseed oil cannot fill the requirements as it is injured by the mortar.

The writer wishes to investigate the matter still further, and will be obliged to any architects who will send him samples of this substance (say a quarter ounce) that may come under their observation.

The writer will make a careful examination and report free of charge, and will publish any results which he deems valuable to the profession.—*Builder and Woodworker.*

PRESSING BRICK.

BY MARGARET ANDREWS OLDHAM.

Perplexed with business cares and rushed
for time the other day,
I paused to see the subject of a joke that
passed my way.
In answer to a well meant question,
"What's to pay with Dick?"
Came this mysterious reply: "You know
he's pressing brick."
I watched him walking through the town
in easy-going style;
He loitered here and lingered there, and
passed you with a smile;
He seemed to have no destined end, ap-
peared in no great haste,—
In fact, I thought he tried to see how
much time he could waste.
His hands with grace and restfulness,
within his pockets lay,
Whose most capacious emptiness gave un-
disputed sway.
And every crowd he passed or left, the
same queer words fell thick;
The same reply I too received, "Oh, he's
just pressing brick."
Day after day, week after week, he passed
with listless gait.
His clothes now rusty, seedy grown, his
manner more sedate,
And yet, whenever I would ask, wherever
he might go,
Came ever these strange, obscure words:
"He's 'pressing brick,' you know."
Poor fellow! Soon he grew so thin, so
thread-bare, pale and gaunt,
I just concluded in my mind the fellow
was in want.
And so in tender charity a resolution
made,
To find out what the trouble was and
freely give him aid.
But fancy my intense chagrin, my disap-
pointment, too,
When he replied with yawning smile,
"Oh well, I thought you knew;
My bread fell on the buttered side—such
things will sometimes be,
In fact, at present, my dear sir, I'm press-
brick, you see!"
The same clear explanation! Well, I let
the matter rest;
To find out what the puzzle meant I'd done
my level best.
But while the flame of reason burns my
life's e'er shortening wick,
I pray to be delivered from the work
called "pressing brick!"

R A T S.

I have it on good authority, writes
a New York correspondent, that John
H. McNamara, a son-in-law of Frank
Timoney, while in the latter's brick
yards at Fishkill, N. Y., recently, saw a
large rat run across the place in which
were a brood of chickens. The old hen,
who evidently imagined her chicks in
danger, ran after the animal, attacked
and swallowed it before it had expired.

THE RAIN AND BRICKMAKING.

The heavy rainfalls of this season have
seriously interfered with the business of
brickmaking in many localities. Where
the old methods of drying on the ground
without other store room except to hake
and cover with boards, the loss in some
instances has been very considerable.
Those that use driers, pallets or cribs
for drying can fully appreciate the ad-
vantages of such provisions. It is diffi-
cult to dry brick in wet weather with
the best appliances—the moisture is
taken up very slowly by the already
saturated air, but when the loss of labor
is added it is a much more serious mat-
ter. But we predict that many open-
yard brickmakers have already deter-
mined to provide better things for the
following season's business.

THE POTTERY TRUST OFF.

The East Liverpool *Crisis* says the
Pottery Trust is finally off, and it is now
admitted that the project was a scheme
of Trenton potters who are very much
disturbed over competition from the
Ohio Valley. The potteries are now be-
ginning to prepare for the fall trade, and
though the proprietors admit that the
business is badly demoralized in Trenton,
yet they think the outlook for the trade
this fall is very encouraging.

FORMING A BIG BRICK TRUST.

Pierre Lorillard at the Head of a \$15,-
000,000 Industry.

NEW YORK, July 21.—Arrangements
are in progress for the formation of a
gigantic Brick Trust, which will com-
pletely throw into the shade the English
syndicate's operations regarding the
Detroit brick yards. The prime mover
in the scheme is Pierre Lorillard, who
already has nearly \$1,000,000 invested in
the Lorillard Brick Company's yards at
Keyport, N. J., and a capital of \$15,000,000
will be subscribed.

Owing to an enormous overproduction
in the brick yards on both banks of the
Hudson and along the Jersey coast, the
business has ceased to be profitable.
Prices have been reduced by competition
to such a point that dealers say there is
absolutely no money in the business
this season.

It was on this account that the New
York and New Jersey Brickmakers' As-
sociation on Wednesday decided upon a
general shut-down of the works on Sep-
tember 1, about two months earlier than
usual. Of course, this will throw
thousands of men out of work.

The association, it is said, has no power
to control prices. Manufacturers who
pay a rent of \$1.25 a thousand on a
capacity of 6,000,000 bricks, could not
afford to shut-down after making, say,
only 4,000,000 bricks, leaving them \$3,500
out of pocket. A few years ago men be-
came wealthy from brickmaking, and
emulations of their good fortune caused
every capitalist in the neighborhood of a
clay bank near the river to embark in
the industry. The new trust will buy
up the larger concerns and crush out
the smaller.

TRADE LITERATURE.

The Kilbourne & Jacobs Mfg. Co., of
Columbus, O., are out with a handsome
catalogue of their specialties. They
manufacture a great variety of Trucks
and Barrows of all kinds, also Wheel
and Drag Road Scrapers, Contractors R.
R. Plows, Dump Carts, Etc. Their Wheel
Scraper is especially adapted for moving
clay from field to sheds on dry press
brick yards, and their list of Barrows
embrace almost every known form and
style. They solicit correspondence and
will be pleased to send a copy of the
catalogue to any of our readers.

C. W. Raymond & Co., Dayton, Ohio.
have issued a new catalogue of their
Brick Yard Supplies, of which, they say,
they make a specialty and as they have
made a study of the matter they know
what is wanted and propose to furnish it
as wanted. Send for a copy of their new
catalogue and keep it as a book of refer-
ence.

Fate & Freese, Plymouth, Ohio, are
sending out a new and attractive cata-
logue of their Clay Working Machinery
including the Ohio Brick & Tile Machine,
which continues to grow in popular favor.
Write for a copy, mentioning the Clay-
Worker.

The St. Louis Iron & Machine Works,
builders of the Lion Dry Clay Brick
Press have received an order from the
Hydraulic Press Brick Co., for two ten-
mold presses. There is no machine shop
in existence that has converted more iron
into dry clay brick making machinery
than the St. Louis Iron & Machine Works
and the excellence of their manufactures
is a source of satisfaction to their custom-
ers. The aggregate weight of brick
presses now in construction at their
shops is about 250 tons and the combined
pressure of these machines, when at
work, will represent near 2,500 tons.

EDITORIAL NOTES and CLIPPINGS.

Winston, N. C., is to have a brick yard.

Elias Day will start a brick yard at Easley, S. C.

J. H. Rogers & Co. will make brick at Union, S. C.

W. G. Barron will start a brick yard at San Augustine, Tex.

McClure & Strange have started a brick yard near Buckner, Ark.

J. W. Bye will make brick near Middlesborough, Ky.

O. M. Sanderson, of Dedham, Mass., will build a brick yard.

Mr. Keasby, of Perth Amboy, will build additional brick works there.

The Star City Brick Co., of Plattsburgh, Neb., has been organized.

Adam Green is enlarging his pottery at New Brunswick, N. J.

McClellan & Woolf will start a brick yard at Piedmont, Ala.

A brick yard has been started at Staley, N. C., by Moffett & Co.

The Jackson (Tenn.) Brick Mfg. Co. intend to adopt oil as a fuel.

Alfred Gollin wants to start a tile factory near Blocton, Bibb Co., Ala.

The Climax Fire Brick & Tile Co. are enlarging their works at Texarkana, Ark.

The American Encaustic Tiling Co., of Zanesville, O., is using crude oil as fuel.

Hopkins & Bane have started a brick and tile yard at Short Creek, W. Va.

A large paving brick establishment is to be built at Fort Smith, Ark., by W. A. Doyle.

Wm. Farrell & Co., Wrightsville, Ark., will purchase brick machinery and start a yard.

The Winona (Ill.) Coal Co. intend starting a large dry press brick plant at that place.

A large brick yard is to be started on Fidalgo Island near Weaverling's Pit, Wash.

The Franklin (Pa.) Paving Brick Co., has been chartered by Hon. Chas. Miller and others.

The Jarden Brick Co., of Philadelphia, Pa., has been incorporated with capital stock of \$1,000,000.

The Fidalgo Brick & Tile Co., of Anacortes, Wash., has been incorporated. Capital stock \$50,000.

R. E. Thomas and W. C. Bradford, of Clarksville, Tenn., will start a brick yard at Cumberland City, Tenn.

The Capital City Vitified & Paving Co., of Topeka, Kan., has been incorporated. Capital stock \$30,000.

Jas. M. Smith and others, of Madison, Wis., have incorporated the River Falls Brick Co. Capital stock \$40,000.

The kiln sheds of the River Falls (Wis.) Brick Co. were destroyed recently by fire. Loss \$30,000. Insurance \$18,000.

R. J. Camp & Bro.'s Works at Campville, Fla., have shut down for the sum-

mer with 1,000,000 brick on hand. The demand is very light now and trade is dull generally throughout the state.

The Jackson (Tenn.) Brick Mfg. Co. are building a large dry house and intend to adopt crude oil as a fuel.

Hiram Blaisdell and others have incorporated the Cartersville (Ga.) Brick, Tile & Stone Co. Capital \$20,000.

The Wheeling (W. Va.) Brick Co. has been organized and will operate the paving brick works at Rush Run, Ohio.

Mr. Harvey Cribbs has purchased the Jordan brick yard at Tuscaloosa, Ala., and will make fancy brick and pottery.

Christian Fell, of the firm of Fell & Heil, a well known brick manufacturer of Trenton, N. J., died July 14th at the age of 55.

E. L. Clark, of Seattle, Wash., has purchased a Eureka Brick Machine and will make pressed brick for the Seattle market.

The Howard Brick Co., Sheffield, Ala., has been organized, with Samuel Keller as President and J. T. Schley, Sec'y and Treas.

It is claimed that a very fine quality of kaolin has been discovered in Western North Carolina 75 miles from Knoxville, Tenn.

Mr. B. P. Eagan, of Lincoln, Neb., is organizing a company to build an extensive brick and tile factory at Nebraska City, Neb.

John Porter's extensive brick works at New Cumberland, W. Va., were totally destroyed by fire July 29th. Loss \$20,000. Insurance \$14,000.

Luther Denny, owner of a tile factory near Octagon, Ind., was caught in the belting of an engine recently and mortally injured.

Wise Bros. are testing the clay and if results are satisfactory they will build a brick yard near Yazoo City, Miss., with 50,000 a day capacity.

Wahl Bros., leading brick manufacturers of Chicago, have sold their brick yard to an English syndicate who will erect a distillery on the premises.

The Monticello (Minn.) Brick Co. has been incorporated with capital stock of \$50,000, by D. P. Montague, L. B. Behan, E. Gill and others.

The Parsons Mining & Smelting Co., of Parsons, Kan., have developed a valuable mine of clay suitable for making "slip" of superior quality.

Fletcher & Thomas, Indianapolis, Ind., report sales of Quaker Brick Machines and Brickmakers' Supplies, generally, as far better than ever before for June and July, the summer months usually being dull in this line.

M. F. Williams & Co., St. Louis, has equipped the Ontario Terra Cotta & Sewer Pipe Co., of Toronto, with a complete plant including one Eureka Dry Press, forty-inch Pulverizer, Revolving Clay Screen, Automatic Feeder, Elevators, Trucks, Etc.

The Colorado Kaolin & Fire Clay Co., of Pueblo, has organized with \$100,000 capital and propose to erect large works for the manufacture of fire brick, sewer pipe and other clay products. They own extensive beds of fire clay and kaolin of excellent quality.

The Somerset (Mass.) Potters' Works Co. are building additions and putting in new machinery to increase their capacity from 500,000 to 3,000,000 fire brick per year. The demand for their fire brick, stove linings, etc., is growing so rapidly that they will abandon the stoneware and pottery trade for the present.

The Jeffrey Mfg. Co., of Columbus, O., manufacturers of Chain Elevating and Conveying Machinery, report that trade has been very active the past month. They have orders for Conveyors and Elevators from various parts of the country, and have just shipped several outfits to Japan and South America.

The Alimo Pottery Co., San Antonio, Texas, has been incorporated; capital stock \$15,000; N. Mackey, Pres., M. F. Corbett, Sec'y and Treas. They have already erected a two story building 100 by 30 feet and are now building the kilns. Their works are in the heart of the city, the clay being shipped from Calverras 20 miles distant.

Commencing August 1st, one thousand mile books of the C. H. & D. R. R. regular issue will be accepted for passage to local points on the Vandalia Line between Indianapolis and St. Louis. In addition to this, these books are good locally on Monon Route (all divisions) and locally on O. I. & W. between Indianapolis and Peoria. Rate \$20.00. JOHN R. McCORD, Gen'l Agt., Indianapolis.

The *Cleveland News* is authority for the statement that Major J. Ritner Kemp, well known to many brick manufacturers, was recently married in New York to Miss Lucie Adelaide Evelyn, of that city. His first wife and family still reside at Youngstown, O., and Mrs. Kemp told a *News* representative that she had never received notice of his having secured a divorce, or that proceedings for one had ever been commenced.

The Caloric Brick Co.'s entire plant at Kansas City, Mo., has been purchased by the Hydraulic P. B. Co., of St. Louis, and a new company incorporated under the title of the Kansas City Hydraulic Press Brick Co., with a capital stock of \$350,000. Mr. John H. Thalman continues as Superintendent. The works will be enlarged and will make a specialty of fine front, molded and ornamental bricks.

The Frey-Sheckler Co., of Bucyrus, O., have had an unprecedented trade for their Clay Working Machinery this year. We learn that the sales during the eight months since the new Company was organized, have been double those of last year's, and we know from personal observation that they then worked night and day to fill orders. In addition to the large buildings they bought last spring,

they have built a new foundry and are putting up a brick erecting shop 35x80 feet with traveling crane the full length, and all the modern appliances to facilitate work. They have bought a number of new additions to their extensive collection of Clay Working Machinery, which an elaborate catalogue now in preparation will describe.

W. S. Collins, who opened an office at 171 Broadway, N. Y., a few months ago as Licensee for the Aerated Fuel Company's System, reports his business as rapidly increasing. Among recent orders which he has taken for placing the System in shops are those of Mr. Fayette R. Plumb, Edge Tools, Frankford, Pa.; Messrs. G. & H. Barnett, Files, Philadelphia; Messrs. Benjamin, Atha & Co., Newark, N. J.; Messrs. Heller & Bros., Files, Newark, N. J.; The Enterprise Mfg. Co., Philadelphia; and the E. P. Gleason Glass Co., Brooklyn, N. Y.

A subscriber at Augusta, Ga., writes that all the yards there have shut down with the exception of Rutherford & Co., they are running Chambers' machine. The other leading yards there are Brown & Stall, who run the Frey-Sheckler machine and make a good, smooth brick; Messrs. Parker Bros., who are putting in Frey-Sheckler machine with crusher and pug mill; the Augusta Brick Co., who run two Sward machines; and W. E. McCoy who is putting in a Frey-Sheckler plant. The building business is quite dull now though indications are good for fall.

Many brick manufacturers have begun to use plain and corrugated iron and steel for their roofing and siding, and find it much better adapted for this purpose than any material they have yet used. The pioneers and leading manufacturers in this line, the Cincinnati Corrugating Co., whose ad. appears on the 105th page of this issue, will be found thoroughly reliable in every respect. They have an enormous list of well pleased customers all over the country, to whom they can refer at any time. All interested will do well to send for catalogues and estimates.

Messrs. Moore & Williams, of Thomasville, Ga., in a recent communication say: "We prize the Clay-Worker and never fail to read it through, as we get more information for the money invested in it, than any other paper we get. We are working a clay that takes all the heat we can give it, burns a variety of colors, and when burnt swells up so that our kilns are four inches higher than when we begin firing. The predominating color of our brick is black. We have recently been to Chicago and have some of our clay there now being tested on a dry press machine, if it does well and there is any demand for black front brick, for trimmings, we hope to fill the bill."

The Boston Fire Brick Co., Fiske, Coleman & Co., managers, whose works are located at South Boston, contemplate the erection of fire-brick works at Martha's Vineyard where they have secured control of large deposits of fire clay of superior quality. The new works will probably be located at Roaring Brook,

so called, in the town of Chiliwork, where there is a good water privilege, and where the company has just completed a wharf. With clay deposits within three feet of top of ground and only half a mile from the works, it is expected that good fire brick can be made and delivered by the company's barges in New Bedford, Fall River and Providence at prices lower than ever known before. It is proposed to make this a summer factory only, at first.

The St. Louis Iron & Machine Works, builders of the Lion Dry Clay Brick Press, report a number of orders for dry press moulds, which they received since establishing their special mould department for new work and repairing. No part of a dry press exacts as much care in construction as the mould and it is peculiar (to say the least) how indifferently most manufacturers treat this most important part. A mould properly constructed, should *never break*, but should *slowly* be ground out by the action of the clay while under pressure. The many broken liners sent to the St. Louis Iron & Machine Works clearly show, that mould making does not get the attention it deserves. Such attention, of course, always embraces an additional expense, but the first consideration of the builders of clay machinery should be quality.

S. K. Fletcher, of Fletcher & Thomas, has just returned from an extended trip through the South, visiting on the route several places where they have recently put in complete heavy steam brick machinery. At the Tennessee Brick & Mfg. Co.'s yards, Memphis, Tenn., the Quaker was turning out 40,000 brick per day. This is one of the best equipped yards in the country, notably its system of racks and clay sheds. There are several other fine yards in Memphis, particularly that of the Memphis Mfg. & Brick Co., where Harry McCain is superintendent; for neatness, Mr. Fletcher says, this yard surpasses any he has ever seen. E. N. Weigle, Little Rock, Ark., erected a complete brickmaking outfit in May last, and for a new yard is in splendid shape and the Quaker is turning out the best brick ever made in that vicinity. The Hot Springs Brick & Tile Co., Hot Springs, Ark., has recently opened up a yard right up in the side of the mountain. Fletcher & Thomas put in for this firm in connection with their complete plant one of the Frey-Sheckler Co.'s heavy Brown Crushers, about 10 per cent. of the material used being hard angular stone. They are turning out splendid brick, also using one of the Raymond Perfection Represses with a full line of ornamental dies. Mr. Fletcher speaks of the prospects of the South and Southwest as great.

Prof. John F. Carroll, assistant geologist for the State of Pennsylvania, is quoted as saying that the supply of petroleum was last year, 5,000,000 barrels less than the demand and that the shortage is bound to become more pronounced in consequence of the failing condition of the different oil fields. A few years

ago stocks were piling up at the rate of 2,000,000 barrels a month, or almost that, whereas they are now being decreased by something like 1,000,000 barrels a month. There are now, it is true, about 12,000,000 barrels of petroleum in tanks in the Ohio field, but this is because Ohio oil has not been used extensively as an illuminant. But the Ohio field, Prof. Carroll believes, will not prove to be so extensive or productive as many suppose. No field thus far known or likely to ever be known, hereafter, will equal the yield of the Bradford, which has produced 56,000,000 barrels of oil, and at one time yielded as high as 105,000 barrels every twenty-four hours. Its production is now down to 18,000 to 20,000 barrels a day and the pool is being drained to the dregs. Possibly there are some pools of 1,000,000 to 3,000,000 barrels in some of the old fields, and in new territory not yet opened up, but the prospects that such is the case are growing less every day. Kentucky may become something of an oil producer, though nothing great, for the oil-bearing sands underlie a portion of that state and lap over into Tennessee. Texas has some oil, but the experiments undertaken in that state by Prof. Carroll for others, convinced him that the petroleum does not exist in paying quantities.

AMERICA'S ART POTTERY SHOW.

The interest in the production of fine pottery goods is becoming more widespread and deeper in America as time advances, and it is indicated from intelligence received from various sources throughout the United States, that the coming American Pottery and Porcelain Exhibition, to be held in Philadelphia will receive the greatest attention from all admirers and promoters of American Industrial art.

So conspicuous has become the interest in the event that the following convenient resolution has been adopted in the Pennsylvania House of Representatives:

WHEREAS, The Pennsylvania Museum and School of Industrial Art is devoted to the development of American art industry, both by giving practical instruction therein and by exhibiting from time to time the products of native art talent and thus encouraging the efforts your own skilled artisans to develop the industrial resources of the United States and to compete with the products of skilled labor abroad and

WHEREAS, The said Pennsylvania Museum and School of Industrial Art, with the cordial and earnest co-operation of the United States Potters' Association, and of different firms and individuals throughout this country, are making active preparations to hold at Philadelphia, during the Autumn of 1889, an exhibition of American Art industry in pottery, porcelain, glassware, stained glass, terra cotta, tiles and mosaic work, including a competition for American workmen; therefore be it

Resolved, By the Senate and House of Representatives of the Commonwealth of Pennsylvania, in General Assembly met, that they hereby most heartily approve of this undertaking of the Pennsylvania Museum and School of Industrial Art, and commend the same to all the people of the United States, and especially to the people of the State of Pennsylvania, as one eminently deserving the strong support and zealous co-operation of every American.

NEW INVENTIONS.

The following is a list of patents appertaining to brick, tile, terra cotta, sewer pipe, pottery, etc., and the machinery used in their manufacture issued since our last number: (A copy of any of them can be obtained by sending 25 cents, the official price, to Chas. E. Brock, Patent Attorney, 925 F St., Washington, D. C.)

- 406,356. Mold for Pottery—S. Jackson, East Liverpool, Ohio.
 407,030. Brick Mold Sanding Machine—A. H. Newton, Cohoes, N. Y.
 407,145. Ornamental Brick—J. C. Anderson, Highland Park, Ill.
 407,102. Sewer Pipe—J. A. Missud, New Orleans, La.
 406,885. Brick Truck—J. P. Craven, Cincinnati, O.
 407,348. Driving Head for Sewer Sheathing—N. E. Green, Minneapolis, Minn.

THE WONDERFUL WEST.

A Wonderful Road offering Wonderful Rates to "Go West" and see the Wonderful crops of a Wonderful country.

Read the advertisement of the Santa Fe Route "Harvest Excursions" to be found in this issue of the Journal.

Half Fare rates to all points in Kansas, Colorado, New Mexico, Indian Territory, Oklahoma, Texas, Pan Handle of Texas, Wyoming and Utah.

Tickets will be sold on Tuesdays August 6, 20; September 10, 24 and October 8.

STOP-OVER Privileges within limit of these Excursions will be allowed on the Santa Fe going and returning.

CHOICE OF ROUTES whenever your destination can be reached by more than one of the Santa Fe Lines.

F. T. HENDRY, Passenger Agent,
 Room 10 Jackson Place,
 Indianapolis, Ind.

FIVE HARVEST EXCURSIONS

VIA

The Chicago, Santa Fe and California Railway to Points in Kansas, Indian Territory (Oklahoma), Colorado, New Mexico, Texas, Nebraska, Utah, Wyoming, Montana and Idaho.

A series of cheap excursions to the western farming country has been arranged to leave Chicago and all other points east of the Missouri River on the following dates: August 6 and 20, September 10 and 24, and October 8. These dates all fall on Tuesday.

The rates for these excursions shall be the lowest first-class fare, one way, for the

round trip. The tickets will be sold at all railroad points beyond, but not on the Missouri River.

The limit shall be *thirty days* from the date of sale.

The tickets will be honored between Chicago and Kansas City, St. Joseph or Atchison, for continuous passage only. Once a passenger has crossed the Missouri River he can arrange with the train conductor to stop at any and all points west thereof embraced within the limit of his ticket. He can use the full limit of his ticket (30 days) in such way as best suits his convenience, as no restriction is placed upon the date that he must reach the ultimate destination of his ticket or return therefrom.

In Kansas a great advantage is offered by the Santa Fe Route by reason of the fact that these excursion tickets will be good going by one of the Santa Fe lines and returning by another.

Remember that the Santa Fe Route runs the fastest train from Chicago to Kansas City, and that this fast train is "The Handsomest Train in the World." It is praised by every one.

Now is the time to visit Kansas the Banner State of the year in the production of wheat and corn.

Call on your nearest ticket agent for rates and maps, and if you wish any further information call on or address

F. T. HENDRY, P. A.,
 Room 10, Jackson Place,
 J. J. BYRNE, A. G. P. A., Indianapolis, Ind.
 Chicago, Ills.

THE LINCOLN HISTORY.

THE CLOSING CHAPTERS IN THE "CENTURY."
 THE GREAT SUCCESS OF THE SERIAL.

Following upon the July chapters of "The Life of Lincoln"—which, as already announced, describe the President's renomination and Mr. Greeley's self-suggested peace trip to Niagara—there will probably be only six more installments of this remarkable history in *The Century* series. It is said that these concluding chapters deal with the most important and absorbing personal and political topics, to which Messrs. Nicolay and Hay bring a vast fund of special information. Lincoln's sagacity in dealing with men and measures (and occasionally his humor) come out in strong relief in the chapters that give the inside view of the attempt of the radicals to defeat the renomination of the President, of the disagreements resulting in Cabinet changes, of Chase's appointments to the chief-justiceship, and of the executive dealings with the "copperhead" conspirators at the North. No part of the work will attract wider attention than the account of the measures adopted by the religious denominations in support of the administration, and of the sympathy and wisdom with which the President met the suggestions of the churches. Of

the interest of the last three installments it is only necessary to say that they cover the period from the second inaugural to the death of Lincoln and the collapse of the rebellion.

The publishers announce that the back numbers of *The Century* from November, 1886, containing the installments of the Lincoln History are now all in print and can be supplied to those who wish to complete their sets. Of several of these numbers two hundred and fifty thousand copies have been printed.

The Midsummer number of *The Art Amateur* is before us, as bright and attractive as ever. Two excellent colored plates are given away with this number; "Carnations," by Dagon, and "Illuminated Initials," from French manuscripts of the XIII century. The frontispiece, a very masterly decorative design, after Bouché, representing "Earth," is the first of a series of four which will be published consecutively. To those interested in china painting, we would recommend a perusal of "Letters to a Young Lady," while Amateur Photographers can gain information from Burbank's "Talks." A special feature of this August number is a full and comprehensive tabulated report of the Secretan Sale in Paris. Montezuma in "My Note Book," and Theodore Child, in the "Paris Exposition," very fully and conclusively describe the pictures at the Paris Centennial Exposition. MONTAGUE MARKS, Publisher, 22 Union Square, New York, N. Y.

NEW ADVERTISEMENTS.

Mitchell Compressed Air Oil Burner Co.,
 Oil Burner.

F. H. C. Mey,
 Clay Elevator and Conveyor.

The Continuous Kiln Co.,
 Combined Dryer and Kiln.

I. & M. Wolff & Coleman,
 Brick and Tile Dryers.

Jonathan Creager's Sons,
 Brick Machinery.

R. B. Smith—Clay Pulverizer.
 Small ads., "Wanted, For Sale, Etc."

Jonathan Creager's Sons, of Cincinnati, Ohio, manufacturers of the Grand Automatic Brick Machine, report the following sales since our last issue: One S. P. Machine, F. C. Whitney, Watertown, N. Y.; one "Special" Extra Heavy S. P. Machine with Pug Mill and Sander, for paving blocks and fire brick, John Porter, New Cumberland, W. Va., (his fifth machine); one S. P. Machine, M. Hochsderffer, Central City, Ill.; one Fire Brick Special, Wheeling Brick Co., Bridgeport, O., and one H. P. Machine to Stevens & Bucher, Ogden City, Utah, in addition to their steam plant now in operation.

If merchants want Bible authority for advertising they will find it in Numbers, xxiv, 14: "Behold, I go unto my people; come, therefore, and I will advertise."—*Kingston Freeman*.

THE CLAY-WORKER

VOL. XII.

INDIANAPOLIS, IND., SEPTEMBER, 1889.

No. 3.

Written for the Clay-Worker.

EXAMPLES OF AMERICAN BRICK AND TERRA COTTA WORK.

No. 19.

THE PULLMAN PALACE CAR OFFICE BUILDING.

This great structure is among the best known as well as the largest buildings in Chicago. The foundation and first story is of red Jonesborough granite with St. Louis pressed brick above and ornamented liberally with red terra cotta.

A belt course of this material above the second story produces one of the finest effects and possesses an artistic richness that is unsurpassed. The building measures 127 x 170 feet and is ten stories in height or one hundred and sixty-five feet to the corner tower. It is thoroughly fire proof in construction, all the floors, ceilings, girders, columns, etc., being covered with fire-proof tile, the partitions throughout the structure are built of hollow tile giving a light but thoroughly substantial division to the interior at a vast reduction in expense as well

as economy of room. The main staircase is of marble and five elevators operate for the use of passengers and the carrying of freight. The steam heating,

ventilating and drainage is upon an improved plan—The Durham system of Iron house drainage—the practical advantages of which have been satisfactorily

advanced knowledge in building economy can supply. Besides containing the general offices of Pullman's Palace Car Company both of this country and abroad the American headquarters will be here located and offices of firms controlling other large interests.

The three highest stories are laid out in flats and arranged for domestic purposes while a portion of the ninth story contains a restaurant for the use of the occupants of the building.



PULLMAN BUILDING, CHICAGO.—S. S. Beman, Architect.

tested at the city of Pullman. In all other sanitary points the building is as perfect in construction and appointments as the best builder this age of

in bringing their wares before the public in such a manner as to at once gain their interest and attention.

These fresh, breezy advertisements are

SUCCESSFUL advertising is an art, and one that is being more highly developed each day. It is an art requiring not only an artist, but a positive genius. Any printer may set an ad. that will look neat, harmonious and give evidence of the experienced workman, but few are capable of originating a distinctively new and attractive announcement. Leading mercantile houses, more particularly in the retail trades, pay high, and apparently excessive salaries to individuals who are capable of evolving novel and practical ideas of value

not by any means the least interesting and valuable points of a live, wide-awake journal. Some publishers regard advertisements as a necessary evil, hoping to see the time when the profits of the paper would enable them to dispense with such patronage. Why so? Advertisements are news. They tell the reader what is for sale, the price, also where purchases should be made. The editor and correspondent do not furnish all that is interesting. The skillful advertiser, by his way of putting things and calling attention to his goods, does much to make a journal valuable and interesting.—*Typographic Messenger.*

Written for the Clay-Worker.

BRICKMAKING AND BURNING. No. 6.

BY J. W. CRARY, SR.

A NOTABLE EXPERIENCE.

If the readers will look carefully over the five articles I have written for the Clay-Worker, beginning with the April number, he will get enough information to enable him to form a very correct idea of clays, brickmaking, setting and burning. These articles give a very general description and theory of the art, and if any intelligent man of good practical judgment, with an inventive, inquiring mind, and an energetic, patient industry and perseverance, will follow the suggestions and directions given in the articles, he will be able to judge and decide, all the main questions preparatory to the establishment of brickmaking.

After all the preliminaries have been decided upon, the next important thing, is to get the services of the very best and most skillful, practical brickmaker. Right here, I will indulge in a little episode of my own life, but the reader will justify my egotism for the value of the lesson. In 1855, a wealthy company here in Florida, undertook to make 65,000,000 of brick for the different U. S. fortifications on the coast of Florida. Not one of this company had any practical knowledge of brickmaking, but they had plenty of money, slaves and credit. They were, however, as cautious and capable as most men of the country and secured advice and services of the best native brickmaker they could get. He told them of suitable locations, they paid \$10,000 for one, and employed this brickmaker to superintend the practical part of the business. He had made and burned brick before on the same place, and they thought they had a "sure thing," but there was a "Lion in the Path."

The U. S. contracted for "best whole hard brick," and there was an officer on the U. S. Works that knew a brick when he saw it. The company dashed ahead and soon had a kiln burned, and although a good kiln for building purposes, not ten per cent. of it would bear government inspection. The company had to go into the brick market, and pay a high price for brick to supply their contract; but they had pluck and determined to succeed making the brick. They worked two years, spent \$75,000 and did not make 50,000 brick acceptable to the government. Then they abandoned the place, bought another at the cost of \$10,000 in the same locality, employed the same brickmaker, and again failed to make and burn brick to suit the contract. The company employed other brick burners, the best they could find with very little better success. They became discouraged, and were about to pocket their loss and quit, when accidentally they were told that I, then living in New Orleans, made a specialty of burning brick for U. S. work, and if they could get my services at any price, they would do well. Now to make a long story short, I took charge of this company's establishment in 1857. 16,000,000 of brick, about 95 per cent. of all we made, went to the government before the war commenced. I got my own price for my services and had my own way. The company recovered their losses and made money.

As I have said in these articles, the art of clay working is the oldest, and has fewer real experts than any other, save what we call "fine arts" and it is no disparagement to these, to say, that a perfect clay worker is an artist of no mean order.

On all three notable occasions, at different times and places, I have made first class brick in large quantities for the U. S. government, when all efforts of others, who had the same or greater facilities, utterly failed to compete. I cannot tell any man just how he can perfectly burn a kiln of brick, no more than an expert painter can tell another painter, just how to naturalize, or imitate the object he desires to paint. I rarely manipulate the burning of kilns alike. Weather, fuel, clay and conditions all these things, are to be noted and considered. The man who burns brick in a given time, with a given quantity of fuel, never was and never will be a first-class burner. He must fire his kiln right, and fire until it is thoroughly burned. He must have varied and repeated practice, and

with all, and above all, a keen analytical and discriminating judgment.

HOW TO TOUGHEN OR ANNEAL BRICK WHILE BURNING.

In some of my former articles, I have said that the art of burning brick, or anything of clay, is very much like that of working and tempering metals. If, for instance, it is desired to make cast iron very hard and brittle, it is cast in a cold iron mold, or chill, so that it will cool quick. If it is to be made soft and tough, it is cast in sand, and the air kept from it as much as possible, until it becomes cool. So in like manner, clay may be made very brittle or it may be made hard and tough, so that it will stand great pressure, or may be cut to a sharp edge or angle, without flaws or fracture. I have annealed brick made of strong clay, silicate of alumina, so that a brick 9 by 4½ by 2½ inches, carried on the flat, the enormous weight or pressure of 250,000 pounds, without crushing. Out of twenty samples of brick from different parts of the country, North and South, only five brick stood 130,000 pounds.

TO ANNEAL A KILN OF BRICK.

The watersmoke should be carried off slow and steady, then the heat should be gradually increased, until the overhangers are as hot as they will stand without drooping. This heat should be kept steady until it can be seen all over the kiln, then the spots on top of kiln, showing the same heat of the arches, and the edges of the platting showing a dark or copper-colored sulphuret, should be closed tight with fine clay, and as fast as these spots appear, cover them over tight until the whole kiln be covered, except the margins, say eight inches from heads and outsides. The kiln is now perfectly burned, and should be closed tight and kept so, until a brick can be taken out from the top without burning the fingers. Then the arches may be opened, and a good strong brick, with uniform hardness and color throughout the kiln, is the certain result, excepting the outside course and one course on top the kiln. The idea of trying to work the fires in the arches so as to burn out slack, or cold places on top, is folly, and a loss of time and fuel as well as a damaging exposure of the brick to the air, when the fires are unequal in the arches. From the time the arches are at the maximum heat, until the kiln be closed, our arch should be kept at the same uniform heat. There is no possible way to work the fire out on the top, with

uniform certainty only by covering as before stated. As the kiln is covered, the draft is forced to the uncovered parts, and the combustion of fuel, when the kiln is covered, very little fuel will keep the arches as hot as they will heat, and the danger to melt is at the same time diminished and the heat throughout the kiln is equalized. I got a patent for this process in 1856, together with other features, and I have never failed at any time, or place, or in any kind of clay, or with any kind of fuel, to make a perfect burn. Platting may be closed on burnt out places, but it is not as good as fine clay to work the fire, and clay don't hurt the color of brick, if shoveled off clean with platting, which should be brick bats. I prefer to "plat" with one course of bats, then as the sulphur shows up on edges of platting, and a place begins to "settle," (if the clay will settle,) I cover the spot with fine damp clay, about three-quarters of an inch thick, so as to stop the draft of heat from that place. This prevents an excess of heat at that point, and saves it for a colder place, and so the process of covering goes on until the whole kiln be covered.

The best way to "damper," or cover a kiln is to have a small scaffold near the top of the kiln, put up a ladder, and two hands will carry clay up in buckets or sacks, as fast as an expert will put it on the places to be covered.

He will not suffer from the heat or even burn his shoes if he will just drop a little clay, where it is very hot, to step on. When he "dumps" his clay on a place to be covered he should spread it with his foot, treading it a little to make it tight.

When the kiln gets cold and ready to open, let a careful hand take a good, straight-edged shovel, and run it under the bats and clay and throw it off; little or no dirt will fall down into the kiln. It takes no extra labor to "damper" a kiln on top, and it makes a perfectly burned, strong brick.

[Copyrighted].

A number of potters are now using electricity for the purification of kaolin and other porcelain clays. The clay is sifted on to the horizontal plates surrounded by powerful electro-magnets, which retain all particles of iron. By this process many clays which have hitherto been rejected as containing too much iron are now used advantageously.

Written for the Clay-Worker.

SEWER PIPES AND THEIR MANUFACTURE.

BY ALFRED CROSSLEY.

[CONTINUED.]

In 1844, Edwin E. Cassell described the manufacture of composition pipes, when oil, tar, or vegetable naptha was mixed with other materials; and in some of the mixtures rosin, vegetable pitch, and sulphur were used. The pipes were formed in moulds and were of an elastic nature.

In 1845, Freeman Roe obtained letters patent in connection with the manufacture of glass pipes, and three different modes are described of joining these pipes, (1) by means of unions and cement, (2) by metal collars screwed together, (3) by forming threads on the glass. All the fittings such as branches, offsets, and bends were made and jointed similar to the straight pipes. It was claimed as one of the advantages that the glass pipes could be made cheaper than iron, in consequence of the removal (in England) of the duty on glass.

In 1851 and '52 the Earl of Dundonald received letters patent for "Improvements in the construction and manufacture of sewers, drains, waterways, pipes, reservoirs, and receptacles for liquids or solids, from a substance never heretofore employed for such manufactures." The "substance" alluded to was bitumen, and it was used for making pipes, and rolled into slabs, it was mixed with oils, etc., to alter the consistency and to soften it. In this connection, it is refreshing to find that now and then an English Earl devotes his attention to an effort to invent something for the benefit of his race, even though as usual his distant plebeian relative heads off his invention with something of more practical value.

In 1852, Mr. Jennings described the making of continuous concrete drains. When the drain track was cut, a layer of concrete was thrown into the bottom of the track, and a core was applied to form a hollow in the concrete, and more concrete was placed on the top of the core, all firmly beaten down; then the core was drawn forward, and the operations continued until the whole drain was formed in the middle of a continuous block of granite.

In 1854 we have probably the first account of the manufacture of drain pipes from slag. This was by Messrs. Smith, Bessemer & Langdon. The slag was run from the blast furnace into

melting pots of fine clay, refined and then poured into moulds.

In 1857, glass as a material is again brought under notice, when Messrs. Turner described the casting of hard block glass into the form of pipes.

Under date of 1860 we have an account of the manufacture of paper pipes. Various patterns of pipes are described, jointed with spigot and faucet, coupling pieces, or screws. Bituminous mastic prepared from the products of gas distillation was used with the paper, and considerable pressure was used in the manufacture and shaping of the pipes and other articles.

In 1863 a gentleman described the manufacture of drain pipes of peat moss, and I suppose this gentleman reached one of the extremities of folly that brainless inventors sometimes get to.

The history of the subject embraces many other inventions and devices, for which patents were granted, all more or less interesting, but which some regard to brevity compels me to pass over. These inventions no doubt cost their authors many a sleepless night and the expenditure of a good deal of money, but they are now known only as matters of history, and for all practical purposes in the manufacture of sewer pipes we are left to the most abundant of all natural materials, clay, which when of proper quality and rightly manipulated, is superior to any other known substance, all things being considered. The sewer pipe body bears the nearest analogy to stoneware, we may say it is in fact a coarse stoneware.

Nothing is definitely known of the origin of stoneware. It was made in Germany, Holland, and Flanders, over 500 years ago, and was first made in England in the seventeenth century. It was originally glazed with galena or sulphide of lead. The discovery was made in England of the art of glazing with common salt. This is said to have been the result of an accident. In 1680 a maid servant on a farm near to Burslem, Staffordshire, through negligence allowed a pot of salt lye which she had on the fire to boil over, the sides of the pot became red hot and when the pot became cold it was found to be covered with an excellent vitreous glaze. The circumstance was reported to the neighboring potters, who at once began to make use of it, and the new "salt glaze" soon to a great extent superseded the lead glaze hitherto in use. The salt makes a perfect glaze, which, unlike leads, resists the

action of acids, all except florid. It was not till about 60 years ago that its great value in this respect was recognized, and from which time the modern manufacture of salt glazed stoneware sewer pipe practically dates.

Before discussing the question of the kinds and varieties of clay most suitable for sewer pipes, it is necessary to know what are the qualities or characteristics required in the finished article, and to a proper understanding of this we must give some consideration of the purposes to which they are to be applied, or in other words to the scope or province to which our pipe rightly belongs. Because the character of the raw material used should evidently be determined as to its suitability to meet the demands made upon it in actual use. It is to be regretted that this evidently rational view of the subject has been very often entirely lost sight of in the past.

The principal use and purpose of glazed earthenware pipes, to which our thoughts naturally revert, is that of conduits for sewage, and to which they were practically confined, until a comparatively recent date. The improvements in their manufacture and superior excellence of finish however show them to be eminently adapted for use as conduits of fresh water supply, as substitutes for iron, to which, wherever their use is practicable, they are very much superior. A third application, in the larger sizes only, is to the construction of culverts under railroads and country highways. This also is of somewhat recent date, and its superiority for this purpose over wood or stone is now undisputed. There are, besides, various other minor uses that might be mentioned, but the three I have named are the most important. The first two uses named call for the same characteristics or qualities in the pipe, and although working in two opposite lines of thought unite in the evolution of the same idea, viz.: that the pipes shall have the property of retaining perfectly their contents during the flow, whether of sewage or pure water, or in other words shall be absolutely impervious to moisture. In the case of the water works conduit it is imperatively necessary that the water shall be delivered fresh and pure as when received from the reservoir or source of supply, and hence the pipe shall be positively proof against absorption from the soil or ground in which it is laid. And in the case of sewer ways it is just as important that it be impossible for the impure sewage matter

to percolate through the sides of the sewer. The soundness of these propositions is now so well understood and thoroughly recognized that I deem it unnecessary to go into any detailed argument to prove them. Another requisite in pipe for sewerage is that it shall be able to resist the action of acids contained in the sewage, and as I have before mentioned, this requirement is most fully met in a salt glaze, which is unaffected by any acid except florid. Another essential requisite in both a sewer and water pipe is, that it shall be of sufficient strength to resist a considerable pressure, either a bursting pressure from within or a crushing pressure from without. It should be the duty of inspecting engineers of sewerage and water works to see that all pipes used comply with this condition, and without fear or favor. How many cases of bursted mains and crushed sewers, often at a great depth in the ground and involving great expense in opening out and repairing could have been avoided by the conscientious examination of every pipe before it went in. It is very humiliating for a manufacturer to have any of his material rejected (I speak to some extent from experience), and on the other hand it is a painful duty for a right minded inspector to condemn a pipe that to the untrained eye is just as good as any other, but the construction of sewerage works is closely connected with the health and life of large communities and involves the large expenditure of public money, and these interests should be of the first consideration. Unfortunately the men placed in this important position are susceptible to bribery in too many cases, and this is true on both sides of the Atlantic. My idea is that any man in such a position who is willing to "take a tip," as we say in England, or who says to the manufacturer "see me," as we say in America, compromises himself to say the least, and should be dismissed from the position, and branded, so that he can never get another similar appointment. Our sanitary engineers when designing public sewerage works should, in their specifications, demand a quality of pipe that meets the requirements of modern science. In regard to resistance to pressure I have not any record by me as to tests of internal pressure. The following table shows the strength of good, vitrified pipe to resist external pressure: (These tests were made by Mr. A. V. Abbott, Engineer, New York. A wooden box was made large enough to admit the pipe and allow

from two to three inches of sand to be packed in at the sides, giving the pipe as nearly as possible, the position it would occupy when laid in the earth. The pressure was then put on top of the pipe, with the following results—average of two pieces each size—each piece being 24 inches long):

Diameter.	Thickness.	Crushed at
18 in.	1½ in.	14,233 pounds.
15 "	1¼ "	24,030 "
12 "	1 "	11,540 "
6 "	⅞ "	28,065 "

What then is our ideal sewer and water works pipe? A pipe of dense, sound body, capable of enduring heavy pressure, so far vitrified throughout as to render it impervious to moisture independent of any glaze, but likewise well and thoroughly glazed inside and outside (but especially inside) with a good salt glaze. I am now speaking of the pipe itself, of the mechanical details I will speak later. I have spoken of a third use or purpose of sewer pipe, viz., for culverts. For this purpose we can be less rigid in our requirements. Being used only as ducts for overflows, or for small branches of creeks, it is sufficient if it be sound and strong, hard, and fairly well glazed. On account of its use in railway embankments and hence subject to heavy pressure, it is made extra thick, called "double-strength," it is made a specialty of, chiefly by St. Louis manufacturers.

It is needless to remark that there is a radical difference between sewer pipes and agricultural or common drain tiles, and yet it is astonishing how much ignorance there is even among intelligent people as to any distinction between them. I have heard many people speak of both under the generic name of "tile," and when asked which they meant betrayed a lamentable ignorance on the subject.

Coming now to speak of clays suitable for sewer pipe making, we may remark a similar ignorance on that subject. Many people seem to have an idea that almost any clay will do for that purpose, and in scarcely anything can they be more mistaken. I have already described the principal characteristics of a good sewer pipe body, and from that we can easily determine what we want our clay to be. We want a clay of good strong body, that will not crack or twist in drying and burning, of only moderate shrinkage or contraction, that will stand up in the kiln under a heat sufficient to

give a good salt glaze, that will vitrify and take a good glaze at that heat, and that will not "air-shake" or "air-crack" with reasonable care in cooling. Do we find any clays that themselves combine all those qualities? We certainly do, frequently. It sometimes happens though that where we do not find a clay like this right to our hand, a combination of two or more clays will sometimes give us the desired result. What kind of clay then makes a good sewer pipe, and possesses the features named? Generally speaking, a fire clay that is not a fire clay—if I may be allowed to use such a paradox—I mean by this a fire clay, that while possessing the elements of silica and alumina in something like proper proportion, contains oxide of iron and alkalies to such an extent as to render it unfit for use under a furnace heat, and is, in other word, what we call a "bastard" fire clay. A clay that will vitrify at a heat sufficient for salt glaze, which we require in a sewer pipe clay, cannot be a true fire clay and should not be classed as such. But if for convenience we must still call them all fire clay, let us keep in mind a sharp distinction between impure fire clays that will vitrify at a comparatively low temperature, and pure (or comparatively pure) fire clays that will stand a very high heat without vitrification. Each of these classes has its appropriate sphere, and so long as kept to its proper use, will fill an honorable and useful place. The following are analyses of sewer pipe clays, Nos. 1 and 2 American and No. 3 English:

	No. 1	No. 2	No. 3
Silica.....	55.20	76.24	72.25
Alumina.....	31.02	16.87	18.08
Protoxide of Iron..	1.90	.16	Perox. 8.57
Lime.....	.36	.50	.39
Magnesia.....	Trace		.02
Alkalies.....	2.07	1.09	.61
Water and loss....	8.90	5.14	—
	99.45	100.00	99.92

(To be continued.)

RECIPE FOR PLASTERING OUTSIDE BRICK WALLS.

The following is a good recipe for plastering on the outside of a brick wall: Take of slaked lime 60 parts; sand, 35 parts; litharge, 3 parts; knead and work the ingredients into a stiff mass with 7 to 10 parts of linseed oil; use old oil or linseed oil varnish. It should be well worked to the consistency required and applied as other mortars, well troweled down. Or, sand, 90 parts; litharge, 5 parts; plaster of Paris, 5 parts, moistened and worked together with a small pro-

portion of linseed oil. Oil the brick three coats before applying the cement, trowel down.—*Ex.*

PROGRESS IN BRICKMAKING.

BY PROF. R. T. BROWN.

This is the age of progress and improvement in all the useful arts. This progress is marked chiefly by improvements in two directions. The first is in the substitution of the inanimate forces of nature for the power of human muscles, and the second is in the displacement of handicraft by the application of mechanical contrivances in applying this power to useful purposes. In this march of the arts toward perfection, brickmaking was slow in starting, though it lays a just claim to seniority among the arts of civilization. The history of this art at different periods, and among different nations, is a curious and instructive one, but it is not our purpose to enter that field at present.

The nineteenth century will be notable in the coming ages as the birthday of great discoveries in the field of science and of inventions in the useful arts, but nearly half the century was past before the ancient art of brickmaking felt the impulse of the age. In the colonial days of this country, ordinary buildings were made of wood, though the better class of edifices were constructed with stone either dressed or in rough masonry. The early brick buildings in the eastern, seaboard cities were built of imported brick brought over the ocean in ships as ballast. These imported bricks are smaller than those now in use in this country and generally, somewhat paler than the fashionable color, but they are burned very hard and appear to defy the tooth of time. The bricks in buildings noted by Wm. Penn, in Philadelphia were imported and they are sound as when laid in the wall. Those who visit Mount Vernon may inspect a sample of imported bricks in the stables built by Gen. Washington after the close of the Revolution.

In other countries the use of adobes, or sun-dried bricks appear to have preceded burned bricks as a building material, but in this country and in England, they never came into general use. This was probably, owing to the dampness of the climate in the first instance, and to the general quality of the clay, in the second. Hon. Henry S. Elsworth, about the year 1845, in his report as Commissioner of Patent, rec-

ommends unburned bricks as a cheap building material for cottages and farm houses. He recommends the bricks to be made 12 inches long, 6 inches wide and 4 inches thick, and laid on stone foundations, in English bond, that is, alternate courses of headers and stretchers. His recommendation is based on experiments made at Washington where the clay is peculiar. Cuts made through beds of this clay will stand, in a nearly perpendicular wall, exposed for years without crumbling. Such a clay would do all that Mr. Elsworth claims for an adobe wall, but such a clay is rarely found west of the Alleghany mountains. Nearly all our clays contain, in minute quantities, what is known in technical language as *delequent salts* which attract moisture from the atmosphere in sufficient quantities to soften the sun-dried clay even when it is protected from the direct contact of water. About 1850, however, the government experimented with a few adobe buildings at Fort Benton, on the suggestion of Mr. Elsworth. We examined one of these buildings, the last summer. It is still in a fair state of preservation, though in a few places the walls had been patched with more modern material.

In New Mexico and Arizona, both the climate and the nature of the clay, conspire to render the sun-dried bricks cheap and durable. Even in this climate, the durability of adobe walls may be greatly improved by covering them by a coat of plaster in which water lime is liberally mixed. But in our country, generally, bricks should be burned.

As we have already intimated, at the opening of the present century the art of brickmaking had made no advance in the last twenty centuries. The methods used and the character of the products were hardly superior to those of Assyria and Egypt and our brick certainly were not equal in quality to those of Rome in the Imperial age. Within the memory of those yet living the implements and appliances of a brick yard were of the rudest and most primitive character. The writer of these lines remembers, distinctly, passing the principal brick yard which supplied Cincinnati with building material in 1820, and watching the operation of tempering the clay with three yoke of oxen walking knee-deep in the brick material, going around in a circle, some 30 feet in diameter. The first advance from this, was the pug mill, which at first was a very rude affair—a section of a hollow sycamore tree, about

five feet long, set on end and an upright shaft placed in the centre, with blades extending from it to near the inner surface of the hollow cylinder. This was operated by a horse at the end of a sweep, which did the work of the six oxen, and did it better. In many parts of the country, where sand was scarce bricks were moulded by merely wetting the mould. They were called slop brick. In those early days the methods of burning must have been very defective, as about two weeks were generally employed in burning a kiln. In what the defect consisted, we are not able to say; but compared with the bricks of the present day, they were inferior in quality, and the loss from melted arches, and from salmon bricks around the margins of the kiln and at its surface, was much greater than is incurred now.

Between 1836 and 1840 several patents were issued for moulding bricks by machinery operated by steam or horsepower. None of these could be called a success, yet every failure, in developing its defects, was a step forward. In 1839 two millions of bricks, pressed from untempered clay as it came from the bank, was made at North Bend near Cincinnati and used for arching the tunnel of the White Water canal. That tunnel is now used by the "Big Four" railroad. The bricks are quite sound, though the machine by which they were made was exceedingly rude. In 1847 a patent was granted to Nathan Sawyer for a machine which pulverized and screened dry clay and moulded bricks of it under a powerful pressure. About the same time, Woodworth and Mowen of Boston took a patent for making bricks on the same principle, but by a different machine. From this date, the number of patents for brick machinery multiplied at an unparalleled rate. These cover nearly the whole possible field in the manufacture of bricks of every class, including the preparatory processes, such as crushing clay, tempering the same, sanding the moulds, etc. These may be grouped as follows: (1) Preparatory machinery; (2) tempering clay, and moulding "soft mud brick;" (3) stiff mud or cut brick; (4) semi-dry clay brick, or those made from clay as it comes from the bank; (5) dry clay brick; (7) arrangements and apparatus for drying bricks preparatory to burning; (8) brick kilns, modes of firing, preparation of fuel, etc.

In the last twenty-five years, numerous patents have been issued for improvements in each of these classes. The

number, we are unable to give accurately, much less to describe the improvements proposed to be secured by each of these. To do this would require a volume, and demand more knowledge than we possess, and more time than we can spare. Suffice it to say, that within that period, no mechanical art has advanced more rapidly than the art of brickmaking, and the arts auxiliary thereto. The only remarkable discovery that has aided in this advancement, relates to the introduction of new forms of fuel for burning bricks. In the use of wood or coal, great difficulty was experienced in maintaining a uniform heat and diffusing it through the kiln. In all forms of solid fuel, the tendency is to concentrate the heat at the place of combustion. This required great care to prevent melting the arches, and demanded a longer period of firing in order that the parts of the kiln remote from the arches might be sufficiently burned. The introduction of natural gas, and crude petroleum in the form of spray, reversed this tendency, as gaseous fuel constantly tends to diffuse its heat as it burns by flame altogether. This relieves the constant attention of the burner in order to maintain a uniform heat as well as of the care to prevent the melting of arches, and materially shortens the time necessary for complete burning.

But the great improvement in brick-making relates chiefly to the relieving of the art of hand-work by the substitution of machinery and vastly increasing the production in a given time, but the quality of brick produced has not been correspondingly improved. It is a significant fact that in those numerous improvements, no one machine has attained such perfection as to drive its competitors from the field. Perfection still lies beyond.

Written for the Clay-Worker.

HINTS ON BRICKMAKING.

No. 39.

BY "R. BRICK."

THE BRICK YARD SUPERINTENDENT.

Little has been written of the trials, tribulations and vexations of this onerous position. He is held responsible for all the blunders, accidents, and unfavorable weather. The employes come to him to have their wrongs righted. The proprietors, with their faces elongated, talk of the great fuel bills, the large pay roll, and that everlasting repair bill—"When are we to get through with that?"—"You ought to make more brick and better

brick"—"Our competition makes more brick with less men and handles them better, (nine times out of ten there is not a grain of truth in this statement), and can't see why we don't do as well here"—and if they should run short of something to talk about or criticise they take a trip East, North or West, and see the improvements and talk with other manufacturers, and return filled up with new theories, and now know a great deal more about the practical part of the business than the superintendent, then for the next month the superintendent will be initiated into the new ways of making and burning brick, and by the end of that time he will conclude that either he knows nothing about brick-making or else the proprietor does not.

The trouble arises from the fact that the proprietor is not a practical brick-maker, and when he visits other brick works he gets an imperfect idea of the thing he endeavors to do on his return. The sensible thing for him to do when he goes to see the improvements is to carry his superintendent with him and together they will learn much that will be mutually valuable to them. "A little education is dangerous," applies to brick-making very forcibly.

The good superintendent is supposed to be on the works before six o'clock in the morning and be the last man to leave, about seven o'clock in the evening, visit the works before bed-time, and get up at least once in the night to see that the fireman and night boss are not "sleeping sweetly there. If he does this and fixes up his books at noon and after supper, he is doing only what he ought to do for he gets paid for all his time. On Sunday he goes to the works just often enough to keep up his temperature to the perspiring point, and gets soot on his boiled linen, an dust on his best "Jim swinger" coat, until his good wife declares that he had better go to, and stay at the brick yard and save shoe leather.

He is expected to be strict with employes and discharge all who do not toe the mark, and always have enough men to keep things moving.

A good superintendent is expected to control and command the respect of those under his charge, and do this without discharging too many, for should he use this prerogative unwisely he would soon be without help, and the works idle.

The best superintendent is the one that can control his men without making many changes among his men, for al-

though most of the work is performed by laborers, yet an old hand who knows just what is to be done and how to do it, is more valuable than a new hand.

The superintendent should at all times be cool and alert, should never get excited, in case of an accident or in time of danger. Again he should always look after the safety of his men, repair or rebuild a dangerous wall or roof before it falls, also study the interests of the firm by whom he is employed. He may feel sometimes that his services are not properly appreciated, still this should not keep him from doing his duty. Your employer may appreciate you without letting you know it, "but a little taffy now and then is relished by the greatest men.

It seems to me that all great and good and wise brick manufacturers, who have efficient and faithful superintendents, should, after the toils and cares of the long hot season of brickmaking, go to the next meeting of the National Brick Manufacturers' Association to be held, the Lord and executive committee only knows where as yet, and take his superintendent with him and combine business with pleasure; take as it were a profitable vacation together, and exchange ideas and notes with hundreds of your craft, who will be there. Don't come like a sponge, only to absorb; don't keep your light under your hat, but get out your little light whether it be one candle power or two, and hold it above your head that it may be seen by others, and I assure you that you will have a better time than you have enjoyed since you had the measles. Your superintendent will learn much that will be of value to you as well as himself, and with higher regard for this our useful craft, and with a determination to do better work the coming season than ever. Again he may enable you to return to your home with your own hat.

Come, my friends, let us reason together. Give the superintendent a chance, and we will have better bricks and more money.

A REMARKABLE BUILDING.

It is possible to swing a cat, says the *New York Tribune*, if any one ever did want to apply that time-honored but rather useless system of measurement, in the four-story brick house at the north-west corner of Lexington Avenue and Eighty-second Street. But to do it without damage to the cat and the furniture, puss must be swung from north to south,

not from east to west, for though the house stands upon a lot 102 feet deep, the land is only five feet wide, the actual width of the building being four feet. The sills and lintels are of white marble, and three bay windows run up from the first floor to the roof. It is probably the narrowest brick dwelling house in the city, if not in the country. Small, round windows, like port-holes, let light into the basement, and the doors are mere slits in the brick walls. It was built in 1882 by its owner, Mr. Richardson, who lives in it. He is a brother of Captain "Ben" Richardson, the eccentric millionaire who died in Harlem the other day, and is a wealthy builder and contractor. He owned the lot, and being unable to sell it at a good price on account of its narrowness, he determined that it should not be sacrificed. So he built a house on it for himself, and though the rooms on the inside are barely more than three feet wide, the family say they do not feel uncomfortable in their cramped quarters.

EXPERIMENTS WITH LIME AND BRICKDUST MORTAR.

A correspondent of the *Engineering News*, Mr. C. H. M. Blake, a civil engineer who is located at Guadalajara, Mexico, writes to that journal the following account of experiments with lime and brickdust mortar:

I was recently called on by two mill owners using the same source of supply for water power to make an equitable division of water, one being entitled to one-third and the other to two-thirds the flow of the stream.

The work necessitated the construction of a measuring weir, with lengths of crest proportional to the division required. It was, of course, important to build the weir as rapidly as possible to reduce the suspension of work in the mills to the lowest limit of time.

Mexican lime while remarkably fine, does not possess hydraulic qualities. So called hydraulic lime is made in a town called Yula, but experiments proved it worthless, and hydraulic cement not being on hand, the combination of ordinary lime and brickdust was resorted to. Having had no previous experience in the use of brickdust and lime mortar, and having no time for experiments, the work was constructed with the proportion of two parts lime, one part brickdust and five parts sand. In ordinary work, mortar in the proportion of one part lime to four parts sand

is usually employed in Mexico with good results.

While the heart of the masonry stood well and finally became as hard as if laid with hydraulic cement, the parts exposed to wash failed, not having time to become sufficiently set to resist the action of the water. From subsequent experiments I attribute this partly to the lime not being perfectly slaked before use.

As it was impossible to delay the construction for a time sufficient to make experiments, Rosendale cement was procured at a heavy expense (\$15 Mexican silver per cask) and employed in the exposed portions of the work.

I have since made exhaustive experiments with brickdust and lime mortar and as other engineers may be called on to construct work under similar circumstances, I venture to submit the result of the investigations.

Equal parts of *unslaked* lime and brickdust were first employed, but the mortar, under water, had no set whatever if used at once. This coincides with the experiments made with unslaked lime and Rosendale Cement in concrete by Gen. John Newton, Gen. Q. A. Gillmore and Wm. E. Worthen, C. E., the results being embodied in their "Report to the Commissioners of Docks on the Bulkhead Walls at Canal and King Sts., New York." (Report 1876, p. 22.)

From numerous experiments the best results were obtained by first slaking the lime for at least four days, then carefully mixing with an equal portion of finely ground brick dust and allowing an initial set before immersion. I allowed two days for this set.

The following formula shows breaking strength of briquettes:

After seven days' immersion, tensile strength 23 lbs. per square inch. After fourteen days, 42 lbs. per square inch, and after twenty-one days, 56 lbs. per square inch.

The samples were broken in a Fairbanks cement testing machine.

The results indicate that where hydraulic cement cannot readily be obtained, the substitution of lime and brickdust is justifiable. Great care should be taken to mix the constituents and thoroughly slake the lime before use. While the set is slow, the mortar is decidedly hydraulic.

The world has fools enough alway,
We know this to our sorrow,
But some not classed as fools today
Will fools be on the morrow.

THE KILN QUESTION.

We are frequently asked: Which is the best kiln? We answer frankly that we do not know, and some of our readers conclude, doubtless, that we are dumb, indeed; not to know; or that our interest and selfishness is such that we are not willing to give our opinion, but the truth is that we *do not know*. And there are reasons why we *do not know*. We do not know your clay and you may not know it well yourself. Though you may have been working it for years. There may be secrets in its composition, in its characteristics, that you have not found out and may never find out. We do not know your method of treating your clay from the bank to the kiln, yet very much depends upon the mixing, tempering, drying and setting of tile as to how it will burn or may be burned or "baked." We do not know as to your skill as a burner. Some men are fitted by Nature to shovel coal into the crater's mouth and "Let her go, Gallagher" for the balance. It is not in them to make the nice adjustment of heat from the color. Some men are "color blind" and cannot regulate the heat in this way. There are others that have their notions and there is not room enough in their heads to accept any amendments or additions to the stock they have in store. They would probably pronounce the best kiln for their clay, that was ever built, a consummate failure.

The time is at hand when the cost of fuel and the amount consumed cannot be ignored for the reason that competition will not allow it. The expense must be reduced or the mill must be shut down. In estimating the cost of burning, it is not the cost of fuel alone, but the labor of burning, the character of the ware, the per cent. of good ware, all enter into the estimate. If our neighbor can and does produce an article for much less than we do, he can sell it for less than we do and no amount of whining on our part will do any good. The thing for us to do is to reduce the cost of production to a point that will enable us to compete, or we must quit the business. If the kiln is in the way of having a margin of profit in your business where the prices are dependent upon the cost of production, then you ought to look around for the "best kiln" for your business. Study your wants closely; learn all you can by visiting the factories where other kinds of kilns are in use. Visit factories which are not in competition with you, the proprietors

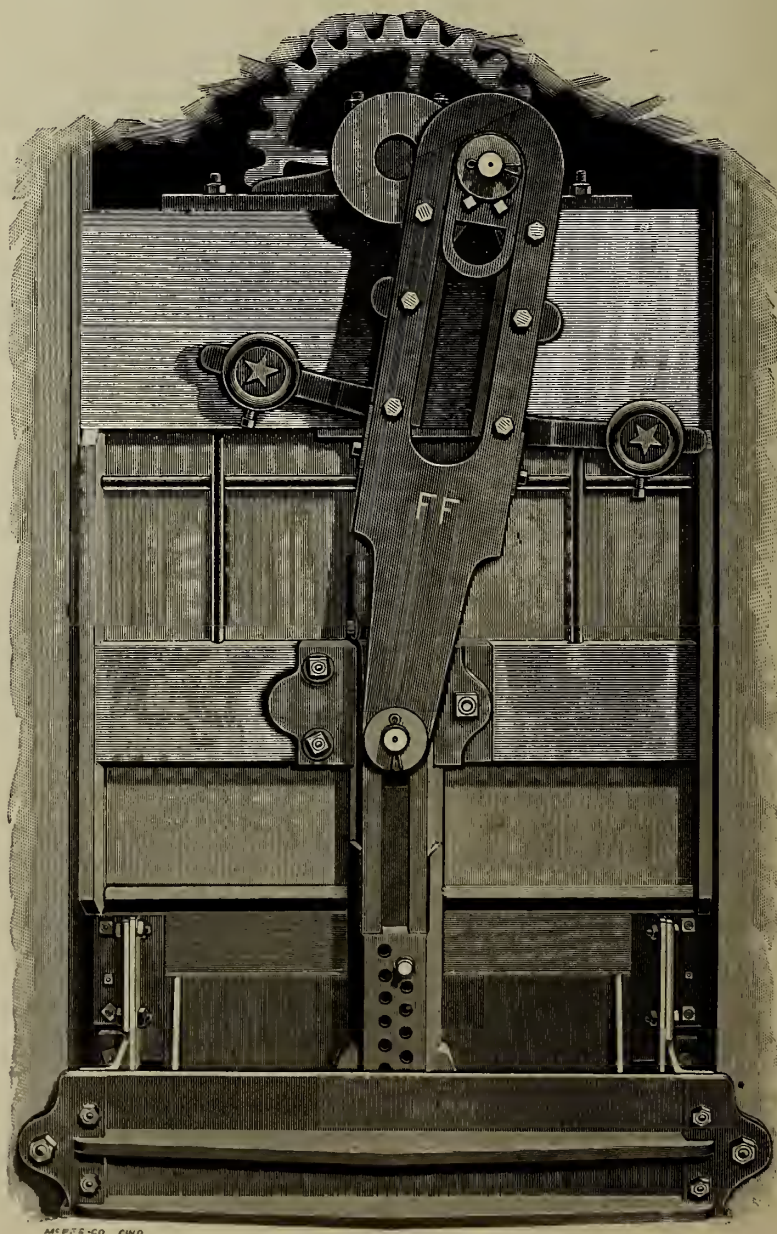
will likely talk more freely. When fully satisfied in your own judgment as to the selection, then be careful in the construction of the kiln. Do not guess at space and distances or vary the dimensions that experience has determined as best adapted to its use. Not a few have made mistakes in trying to improve what they did not fully understand themselves.

THE LATEST FAD IN BRICK MACHINERY.

The following cuts illustrate a valuable device invented and patented by Jonathan Creager's Sons, the well-known manufacturers of the Grand Automatic Brick Machine, Cincinnati, O.

It is a novel contrivance the object of which is to prevent the breakage of the

machine caused by stones and other obstructions getting in the molds or presser box. It is simple and perfectly automatic in operation, whenever the plunger meets an obstruction the "Relief Pitman" is instantly released and though the machine may continue to run no harm is done as the plunger remains stationary. Cut No. 1 shows the Pitman as it appears when the machine is in operation and the plunger just ready to press the clay into the moulds. It may be set so that the pressure necessary to force the clay into the molds, stiff, is easily obtained and this and no more pressure is given each mould. If from any cause the pressure exceeds the desired amount the Pitman releases itself and becomes an idler (see cut No. 2) when the obstruction can be removed



CUT No. 1.

and the Pitman reset in a few seconds, thus affording absolute protection against breakage and annoying delays.

It is a scientific and practical device for pressing each brick uniformly and thus is especially desirable for making brick for repressing.

The Relief Pitman may be placed on both the all-iron and wood frame machines. Many are already in use giving entire satisfaction. It is a valuable improvement to the Grand Automatic which had already achieved a most enviable reputation. The manufacturers claim that for strength, and durability especially it is among the very best of its class and invite the trade to investigate its merits thoroughly.

A PROSPEROUS COMPANY.

The sales of the Marion Steam Shovel Co., of Marion, Ohio, last year included thirty-three steam shovels, seventeen dredges, and twenty-seven ballast unloaders amounting to almost \$200,000. Their business through the first half of the present year aggregates almost as much as the entire business for last year. The general management of this immense business devolves upon Mr. H. M. Barnhart, the inventor of the steam shovel and wrecker which they manufacture.

The Steam Shovel is in use in a number of brickyards giving excellent satisfaction. The rapidity with which clay may be dug and loaded makes their use almost

imperative to attain the best success in turning out the largest possible product. Another and important advantage in many clay beds is the thorough mixing of the clay from bottom to top in every shovelful taken out. The excellence of workmanship is fully attested in their strength and durability.

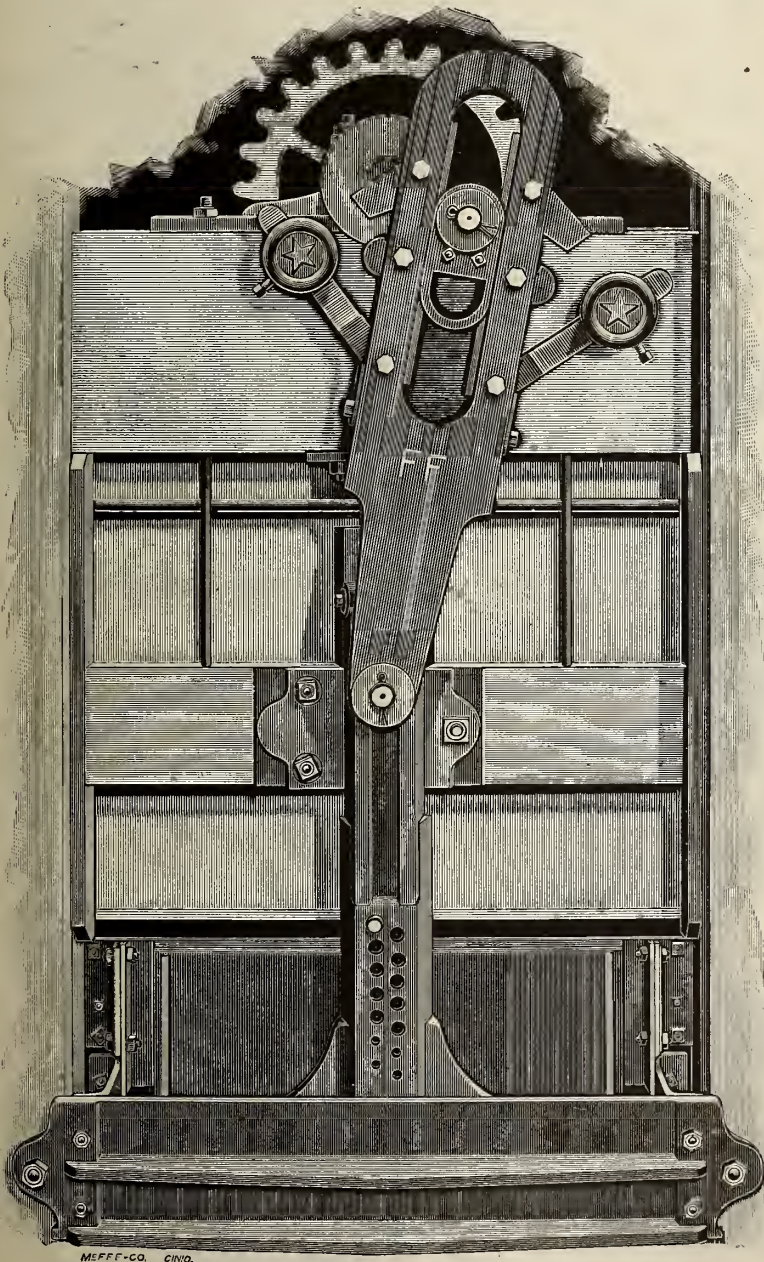
In a recent number of the Democratic Mirror (Marion, O.), a full description of the works, illustrated, is given, together with a full description of the various machines and their many points of excellence. Upon application, the Marion Steam Shovel Co., Marion, Ohio, will forward a full descriptive catalogue of their machinery.

THE EUREKA BRICK MACHINE.

The following item of news is clipped from the *San Antonio Daily Light*, San Antonio, Texas:

"The Mackey Brick and Tile Co., of this place has a cash capital of \$75,000 paid up. The Co. owns 2,894 acres of land free from encumbrance, having 106 acres of excellent clay. The Co. has recently constructed a two-story machine room 36x40 feet; an engine and boiler room 30x40; shed for housing clay 40x100; two drying sheds with a capacity of 25,000 brick; one clamp with iron roof, with a capacity of 264,000 merchantable brick. They have an Atlas engine and boiler of 75 horsepower. This engine furnishes ample power for two Eureka Brick Machines and crushers. The one already in use is warranted to turn out 20,000 pressed brick in a run of 10 hours. The machine and crusher was put up under the superintendency of H. A. Keller, Vice-president of the Eureka Co., St. Louis, Mo. The machine itself is a ponderous affair, weighing 38,000 pounds and exerting the enormous pressure of 40 tons on each brick or 160 tons for the four brick forming a table. The machine had only been working two hours when we first saw it and was working away steadily, smoothly and satisfactorily, giving evidence of the very perfection of motion when the machine has fairly adjusted itself.

"The clay is prepared for the pressing machine by Stedman's Disintegrator, a perfect adaptation of means to end. The pulverization is done by centrifugal force and can be regulated at will by increasing or diminishing the revolutions of the fingers within the box. The dies for pressing the brick are steam heated by an ingenious contrivance and the moisture of the clay forming a partial



CUT No. 2.

vacuum in contact with this heated surface, prevents all possibility of the dies clogging. New as was the machinery and unscoured the surfaces of the tables the work was done smoothly, each hour showing an improvement, the edges of the bricks coming from the machine as perfect as though chiselled out of stone. So hard were these bricks on coming from the dies, without drying, that Mr. Keller using one as a hammer drove a ten-penny nail through a hemlock plank without breaking the brick. The Eureka Machine has been in use eight years has been introduced into every state in the Union and is doing satisfactory work everywhere."

In this connection, it is worthy of remark that the Eureka Co. have confined their advertising exclusively to the Clay-Worker for the past three or four years and the result has been highly satisfactory bringing inquiries and orders from all parts of the United States and Canada, to say nothing of inquiries from other countries.

AN AUTOMATIC REPRESS.

Considerable doubt has heretofore existed as to the practicability of repressing brick by machinery so as to preserve their smooth surfaces, perfectly developed edges, and accurate shape. The manufacturers of the press here illustrated claim to have dispelled such doubt and point to the fact that eight of their presses in use for several months are giving as good results as can be obtained by hand pressing.

The capacity of the press is limited only by the dexterity of the operator in feeding it. In the single die press ten to twelve thousand are made per day, requiring one man and boy to operate it, while in their Duplex machine, double this product is obtained.

Less than one-half horse-power is required to run it.

Arrangements are made in the construction of the machine for keeping, as far as possible, all brick of uniform thickness and protecting their finished

surfaces during transit through the machine.

The automatic mechanism for feed and delivery is simple and shows very little liability to get out of repair.

The Duplex machine, in addition to making great numbers of brick, is large enough for roofing tile, paving blocks, and various other clay products required to be made in a speedy and economical manner.

Parties who desire a simple, practical machine, which is not excelled in speed or equalled in the quality of its work are requested to write to the manufacturers, Messrs. C. W. Raymond & Co., of Dayton, O., for further information.

"A Perfect Machine."

SUCH 'TIS SAID IS THE NEW AUTOMATIC.

DAYTON, ILL., Sept. 3, 1889.

C. W. Raymond & Co., Dayton, O.:

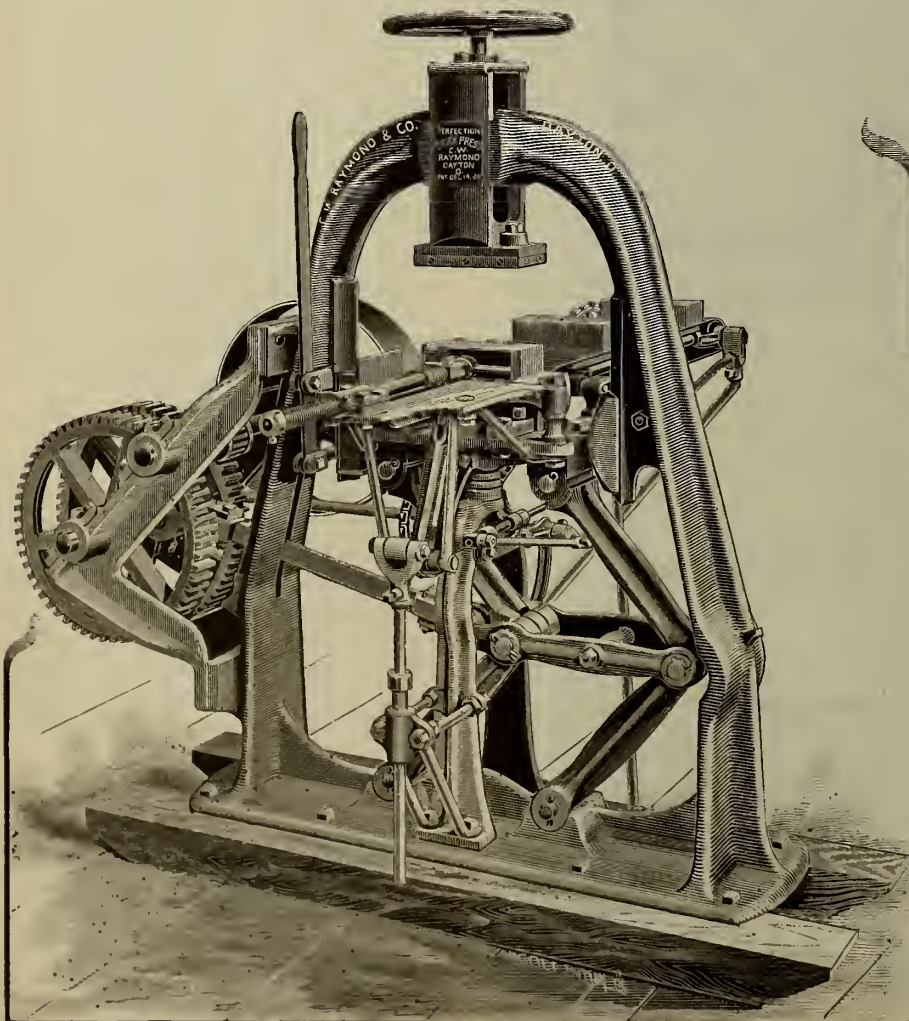
Referring to the Automatic press shipped us June 29th, it gives us great pleasure to testify to its good qualities. It is a perfect machine and does the work of four men, making a great saving in point of labor and always makes uniform bricks.

Very truly yours,
FOX RIVER BRICK CO.,
H. E. WILLIAMS, Gen'l Man.

BRICK FOR PAVING STREETS.

At the present time when brick pavements are receiving so much attention, a few remarks on the subject of making the most satisfactory brick for paving purposes from a suitable clay will not be out of place, and would no doubt lead to a profitable discussion.

In general terms pure clay, or kaolin, is a hydrated silicate of alumina; while the ordinary clay is a mixture of such with silica (sand), in a more or less finely divided state, lime, magnesia, soda, potash, iron, and indeed most of the substances which go to make up the surface of the earth. Kaolin and silica are the main ingredients, however, with varying proportions from strong clay to loam. The kaolin gives to the clay the power of becoming plastic when mixed with water, while the silica is a necessary ingredient to prevent a too rapid contraction on drying, which is the cause of cracks. When clay is burnt at a high temperature the kaolin loses its chemically combined water and becomes an exceedingly hard substance, cementing the particles of silica together and forming pottery, terra cotta, or brick, as the case may be. If the silica and the kaolin are in the right proportion, finely comminuted, intimately mixed, and burnt at a high temperature so as to drive off all



RAYMOND'S NEW AUTOMATIC REPRESS.

of the chemically combined water, an infusible substance is obtained which is impervious to water, harder than flint, with an appreciable amount of toughness and elasticity, and which, if white, is called porcelain. The glaze commonly seen on porcelain is both artificial and superficial and is not the porcelain proper.

Now let us see in what way the other substances present detract from the qualities of porcelain, or the perfect paver, at least theoretically. In practice, it would be apt to be found too hard.

The soda and potash are of no harm and possibly some good when in small quantity, but when in large quantity they form with the silica an easy fusible slag, permitting the brick to melt down before the necessary temperature is reached at which the full change takes place in the kaolin. When such clay is used it has to be burnt at a very low temperature, and, as the fusible potassium or sodium silicate acts as a glassy cement, you get a weak, brittle brick. Lime and magnesia, usually associated with carbonic acid which is lost in burning, have a somewhat similar effect, and if in quantity give a brick both weak and liable to crumble when exposed to the weather. The iron, if thoroughly mixed, does little harm, but if in quantity and in lumps it burns to the black oxide and makes weak points in the brick.

And now supposing that we have a strong clay free from any large admixture of injurious substances how shall it be worked so as to produce in the highest degree possible those qualities necessary for pavers?—viz., *smoothness of grain*; *hardness*; *toughness*; and, what is of first importance in northern latitudes, *imperviousness* or closeness of grain. I may say before going further that there are some clays which seem to have had every preparation already made by nature, and which make a fair paving brick when worked in any way.

The object now is to get the particles thoroughly mixed and as close together as possible, so that the result of the chemical change may find the particles uniformly and firmly. Working with water accomplishes the end of mixing in the most thorough way, and all clays are improved by being well pugged. If it is worked into shape after drying but slightly, as in the case of hand made bricks, you get a very porous brick on account of the large excess of water which goes off on drying, and because the air which has been inclosed in the

pugging makes little hollows. The conclusion thus arrived at is that after the clay is pugged it should be worked as stiff, and under as great a pressure as possible, in order to get rid of the two difficulties mentioned above; and would seem to indicate that the brick from a stiff mud machine would be more close and compact throughout its mass, and as a sequence that on burning a more uniform action and a firmer, harder, and more impervious mass would be the result. Such I have uniformly found to be the case. There now comes up the question of toughness, and as that is a property but little considered generally, I would like to call the attention of both brickmakers and machine makers to it, as of utmost importance in pavers, and as a property which can be controlled to a great extent. It depends largely upon the fibre of the brick; for a brick worked in the wet way has essentially and distinctly a fibre, or grain, and it plays a most important part in the toughness of the brick. I think that the great toughness of the auger machine brick is largely due to the combination of a twisted structure on the inside and a longitudinal structure on the outside. However that is, out of a very large number of samples of pavers made from ordinary potters clay which have come to my attention, uniformly the best have been stiff mud bricks, and in many cases they were so infinitely superior to brick made by other methods from the same clay that I feel justified in making the assertion that any strong clay properly worked will furnish satisfactory pavers. It is clearly seen that direction of the fibre can be largely controlled by the machine and the die, and it opens an interesting field for investigation by brick machine makers. As wear cannot be entirely eliminated it must be made as uniform as possible by having the grain of the pavers smooth. It is the granular nature of the dry press bricks which is one of the causes that make them so generally unsuited for paving purposes. I may say that among the stiff mud machines I have generally found the auger machines to make the best pavers, though there is little difference.

There are two words which are used in regard to paving brick which are misnomers and ought to be gotten rid of. The first is "fire-brick." True "fire-brick" is absolutely useless for paving purposes. Advantage is however obtained by having a clay that will stand a temperature sufficiently high to admit of complete

chemical change taking place. The second is "vitrified brick." This name should apply to the bricks cemented together by the glassy fusion mentioned above, and are usually useless for paving purposes. The word "pavers" should apply to brick, irrespective of the clay from which they are made, which possess in the requisite degree the necessary qualities of smoothness of grain, hardness, and imperviousness. Whenever some standard in these respects shall have been settled upon all of the qualities can be determined definitely in a laboratory; though actual use is, of course, always the best test, as what is lacking in one particular is often made up in another.

As I have said above most strong clays, if worked in the right way will furnish satisfactory pavers, and it behooves brick men all over the country to examine their clay to that end. The question of brick paving is not one of to-day, or of to-morrow, but of the entire future, and presents the possibility of enormous demands annually increasing. Every brick-maker is interested in the subject directly or indirectly, and should do all he can to assist the introduction of a brick pavement in his vicinity. Remember, however, that for success good material must be used, and that "brick" is but a generic term and covers a series of products varying among themselves as much as do various stones. C. C.

A CHIEF SOURCE OF CRIME.

Neither Sunday-school nor day-school training, nor even temperance, is fullest safeguard against criminality. The most common fact about convicts seems to be that they were never taught habits of industry. This is the case with nine-tenths of those in the Eastern penitentiary of Pennsylvania while quite a large proportion received a "good schooling," and about one-fifth were abstainers from drink. Of 1,500 at Joliet, in Illinois, 1,087 were fairly educated; 129 were college graduates, 413 classed as intemperate, 784 moderate drinkers, 317 total abstainers. Of 668 admitted last year two-thirds have no trade. Evidently it is time to give the hands more to do in our schools than merely turning over books and using pencils and pens.—*Ex.*

Ethel (shuddering)—"How the trees moan and sigh to-night."

Bobby (speaks whereof he knows)—"Well, I just guess you'd moan and sigh too if you were as full of green apples as they be."—*Exchange.*

CORRESPONDENCE.

THESE COLUMNS ARE OPEN TO ALL. THE FULL NAME AND ADDRESS IS REQUIRED BUT WILL NOT BE PUBLISHED EXCEPT WHEN PERMISSION IS GIVEN BY CORRESPONDENT. THOSE DESIRING TO COMMUNICATE PRIVATELY WITH ANY CORRESPONDENT WHOSE FULL NAME IS NOT GIVEN CAN DO SO BY ADDRESSING LETTERS CARE OF CLAY-WORKER.

Plastic Wire-Cut Brickmaking near Petersborough, England.

Editor Clay-Worker:

In your June, 1889 issue, you published a letter from myself concerning pressed brickmaking. I now send you a similar communication concerning plastic wire-cut brickmaking—called in America “stiff mud bricks.”

These plastic wire-cut bricks are made from plastic clay which lies immediately above the “knots” referred to in my June letter. The clay is got during the winter months, watered, and made into bricks during the ordinary brickmaking season, say from commencement of May to end of October. The clay requires nothing whatever mixing with it, but road scrapings from a road repaired with granite improves it very much. No expense has been spared for machinery, in

fact we have the best that money will buy. In case of an order for any special sized, or special shaped wire-cut bricks it takes five weeks to manufacture the bricks. The bricks are of good quality and sell freely—they are dried in the open, under shades. We are liable to loss from bad weather.

MACHINERY USED.

One 16 horse-power portable engine in some yards, in other yards the machinery is worked by the same engine that works the semi-dry machines. One horizontal or vertical pug mill, pair of expressing rollers fixed in the front of the pug mill. One side-delivery cutting-off table, cutting off ten bricks at a time and delivering them on a board without handling. In some yards the clay is filled into tip-wagons which wagons are hauled up by the engine, in other yards the clay is wheeled to the pug mill, but there is but little difference in the expense, certainly not more than 4d. per 1,000 bricks.

Since I wrote my June letter I have found out that your correspondent, Mr.

A. Crossley, of Ironton, O., sells the side-delivery cutting-off table I referred to, and the only thing that surprises me is, that a cut of it is not advertised in your paper. A brickmaker only wants to see it at work once to get it.

Analysis of the top plastic clay:

Alumina	2.10
Silicious insoluble matter.....	58.20
Iron	4.80
Lime	11.70
Magnesia	0.30
Alkalies.....	Traces.
Combined water	7.00
Carbonic acid.....	9.20
Sulphur	1.25
Carbonaceous matter	3.60
Phosphoric acid	Traces,
Oxygen and loss.....	1.85
	100.00

The bricks burn cream color, will stand frost, are of very good appearance and used for the best face work.

In my next letter I will endeavor to point out the differences between the two descriptions of bricks, and how from a brickmaker's point of view, one sort is very much better than the other. Several of your readers have written me concerning my June letter and I have replied to them by post, but to future letters, which I shall be pleased to receive, I will answer (with your permission) through the Clay-Worker.

R. S. BLUCK.

Petersborough, England.

New York News.

Editor Clay-Worker:

The brick market has been a very active one the past month, building being kept up steadily in spite of the fact that the metropolis and its neighborhood has seen as steady a downpour of rain as has ever visited these counties where rainy seasons are commonly looked for at certain periods of the year. In spite of the fact that the supply has been in excess of the demand prices have remained steady. At times there have been large accumulations on the market, but prices were so very near the cost of production that any reduction would have been met by the shutting down of the brick yards on the part of the manufacturers.

The very rainy season that was experienced up to the middle of August has prevented the usual production, and this has allowed the price to be maintained. The present good weather is being taken advantage of by manufacturers to produce to their utmost capacity and all sheds, as a rule, are filled. The manufacturers are asking for extra boats and the supply on the market will again be largely in

COST IN DETAIL OF MAKING PLASTIC WIRE-CUT BRICKS, LONDON SIZE, AFTER BEING BURNT, 9 INCHES LONG, $4\frac{3}{8}$ INCHES WIDE, $2\frac{3}{4}$ INCHES THICK.

Work done during the winter	Brickmaking and burning.		@ per 1,000 bricks.	Cost per 1,000 bricks
Men. Boys.	Men. Boys.		£ s d	£ s d
9 2		WORK DONE DURING THE WINTER MONTHS.		
		Removing all earth, gravel, spoil, etc., above the clay and spreading same where desired, clearing the surface of the clay—digging the clay and depositing same for weather to act on @ per 1,000 bricks. [This when thrown into cube yards costs for the top stuff and the clay about five pence per cube yard of material shifted].....	2 6 4	2 10
		Watering and tempering the clay.....		
		WORK DONE DURING THE BRICKMAKING SEASON.		
	1	Watering the clay in heap previous to its being filled into barrows.....	3	
	4	Filling clay into barrows, wheeling same to, and tipping clay into pug mill.....	1 0 3	
	1 1	Attending pug mill top.....		
	4	Cutting bricks off 10 at a time with a side delivery table.....	1½	
		Wheeling bricks from cutting-off table and setting same in hacks.....	1 0	
	1	Skintling bricks.....	2½	
10 2		These 10 men and 2 boys will make about 20,000 bricks per day.....	2 10	
	2	Brick burners, with extra labor when on full fires.....	1 0	
	1	Engine driver with portable engine.....	4	
		Sundries, such as building up wickets, fixing platting, wheeling coal, etc., done by men overtime, or by an odd man.....	3	4 5
13 2				
5		Wheeling bricks from hacks and setting in kilns.....	1 0	
6		Drawing kilns and unloading bricks into carts or stacking on ground.....	9	1 9
10				
		Coals for burning bricks in Dutch kilns (all our plastic wire-cut bricks being burnt in this class of kiln.) Mexbro cobbles used costing 12 d. per ton delivered at the kilns.....	4 0	
		Coal for portable engine—Annesley hard @ 13d. per ton delivered at the engine.....	7½	
		Oil, waste, stores for engine, etc., etc.....	1	
		Cresote brick oil for brick machinery.....	½	
		Sundries, such as repairing kiln, fire-holes, protecting bricks from weather, repairing covering, etc., etc.....	3	5 0
		Cost per 1,000 bricks.....		14 0

The foregoing is prime cost only, and does not include wear and tear, rents, rates and taxes, interest on capital, etc. One shilling equals 24 cents, one penny equals two cents. 40 bricks per 1,000 allowed for waste, i. e., every 1,040 bricks counts as 1,000.

excess of the demand before September is ended. This will without a doubt break the present firmness and a "clump" will occur. The quality of the brick made this year is equal to the average of former seasons.

I unwittingly overheard a conversation recently over the unreasonableness of certain builders who give special orders for a certain kind of brick and then become angry if their order is not filled within a day or two.

"It's a positive shame," said one of the speakers, "and the only way I can account for it is that most of them really know very little about brickmaking. They will give an order for so many thousand of front brick and want them a special size, a special shade, a special quality. You may tell them positively that it will be a question of five or six weeks before they can be ready, and in doing so you make no allowance for possible mishaps in the kilns or at the yards, for rain, or for the slowness of the boats to carry them down the river. Yet if they're a day late you never hear the end of it. Only lately a builder threatened to get his bricks elsewhere just because the boat on which my bricks were coming down had a slow Captain and they would be a few days behind. It's about time builders began to understand that you don't order bricks as you do dry goods at a retail store—to be sent to your house in an hour."

James Concklin, of Aldrich Bros. & Co., formerly of Haverstraw, died on August 23rd at his residence in Dutchess Junction, N. Y. Mr. Concklin has probably the most famous and best known brick manufacturer on the Hudson River. He was a man of the strictest integrity, and one who put his conscience into his work, so that no other recommendation was necessary for the selling of his brick than the fact that he put his name to it. The business will be continued by the remaining partners of the firm.

All of the brickmakers at Haverstraw are strongly in favor of the World's Fair to be held in this city in 1892, and Gen. I. M. Hedges and Denton Fowler, Sr., expressed themselves recently as enthusiastic on the subject. Ex-Mayor R. A. Vervalen intends exhibiting his brick-making machinery.

Cornelius Simoson, of Chelsea, Staten Island, recently discovered on his farm what is believed to be a valuable deposit of brick clay. The bed is three feet below the surface and appears to be of

large size. If the deposit turns out to be a valuable one, the new industry of brickmaking will be developed on the Island.

BRIC-A-BRAC.

The Village Brickyard.

Editor Clay-Worker:

In the Clay-Worker for September, 1887, was shown the profit per 1,000 brick clear of every direct and collateral expense taken from the actual business of a complete year in which the sales were about one million brick. It was hoped that this exhibit of the working of a four gang hand yard would stimulate some brother brickmaker interested in a machine yard to produce his balance sheet. The profit named was \$2.38 per 1,000 brick. Why it is that no response has been made I cannot tell, unless it be that all the brothers are making so much they are fearful to divulge the secret or are making so little they are ashamed to invite comparison.

Sometime since it was decided to remove the Philadelphia House of Refuge or reform school from the city to a farm of five hundred acres some twenty miles distant for the purpose of colonizing the inmates in cottages or families of thirty or forty, with a father and mother to each house.

On the farm are to be placed certain buildings for administration, chapel, reception and workshop, all large and built of brick, with stone basements and trimmings.

The quantity of brick required for these of assorted qualities is about three million, and for the purpose of securing them as low as possible the contractors invited bids from various yards within twenty-five miles of the site; which were as follows:

Mr. W., (Chambers' machine),	\$29,076.50
Mr. B. & Son, (Martin machine),	25,768.75
Mr. R., (Hand-made),	27,201.00
Messrs. L. & D., (Martin)	25,825.00
Mr. K., (Martin)	24,391.00
Mr. S., (Hand-made)	24,214.60
Mr. V., do.	24,411.19

All delivered on the ground.

Now if it is true and can be demonstrated that either of these machines can produce brick more cheaply than hand-labor, why is it that five of the bids are so close together and that the fact of how the clay was handled makes no difference in the cost? If Mr. V. in his bid of \$24,411.19 has a margin or actual profit of \$6,742, why is it his neighbor with a Martin or Chambers' did not under bid

him at least a \$1,000? And these two machines are of their classes at least fair representatives.

And another point should be noted, the bids were taken from yards not in local competition alone but scattered from five to twenty-five miles apart.

Must we then conclude that the machine yards are not satisfied with \$2.38 per thousand profit, or must we conclude their losses on plant are so heavy as to wipe out all this advantage.

Why is it all the little hand yards continue to thrive right under the shadow of the machine yards, and dry kilns? Are we here to stay? Or are we daily being crowded out? Is it possible there is no man with a machine or kiln to sell that has the grit to give us an honest answer to such plain business questions?

The Village Brickmaker wants to make money and does make money, and sees quite as many brothers wrecked by attempting to run clay through iron as in any other way. But then it must be fairly admitted all men are not qualified to run machinery to a profit and the machine to run such a set of men has not yet been completed.

VILLAGE BRICKMAKER.

Why They Fail.

Editor Clay-Worker:

On a recent trip made in the interest of our "Lion" Press, I could not but observe how grossly careless some brick yards were managed. It is so often pointed out that the dry press system has been a failure in a great many yards and usually the press is held responsible but in the yards I visited, the failure was certainly in the fact that no attention was paid to detail, no care bestowed upon the preparing of the clay, in short, no money spent for anything but the press.

Without mentioning the territory I made my observations in and without giving names, dates or kind of press, I will give you a little pen picture of what I saw, hoping it may have beneficial influence where such is needed.

YARD No. 1.—The preparing machinery consisted of a dry pan of ancient date, with a few holes broken into it large enough to let lumps as large as hen's eggs pass. The clay thus pulverized (?) was carried above the press and passed over a common sand screen into a spout where it clogged every now and then and had to be pushed down by a laborer. The clay was fresh from the bank.

YARD No. 2. I saw this yard a day

after a good rain. It was by no means a *dry clay* yard and was not running on account of the previous rain. The machinery was so carelessly placed in an open shed that water and mud was several inches deep all around it and work made impossible. I inquired for the clay they had stored and was shown a large pile of clay which had been properly plowed, harrowed, scraped and piled up *and then left without a roof over it.* The kilns were so poorly protected that the rain had washed up the newly set bricks; in short, everything was of the most primitive character.

YARD No. 3.—No clay shed! The clay taken from the bank was in such a condition as to clog up the pulverizer every few minutes, thus giving but an inadequate supply of raw material to the press. It would run 10 minutes, stop a while and again run awhile.

These *dry pressed* bricks were so soft when they left the press that I could make an indenture with my finger without very great exertion. The bricks were set into a new kiln built on the side of a hill on a terrace, but so negligently put up that before it was half filled the foundation had sunk considerably and a few days after I had seen it, the rain washed under it demolishing what might have been a source of profit if properly erected.

Is it such a wonder that such yards are not very successful with their dry press plants? Isn't it rather surprising that they get along at all? It certainly is no small compliment to the dry press process that they are able to keep above water under such unfavorable conditions. It was refreshing to me to return to St. Louis and visit some of our yards where the necessity of careful and business like attention to all details is fully recognized. R. S.

Quite Different.

Editor Clay-Worker:

The last edition of the Clay-Worker contains a letter on burning pressed brick by Thomas Parker. For fear that some one might be lead astray by those absurd theories of Parker's, I will state that the brick he (Parker) writes about were burnt by him for this company. And instead of their comparing favorably with nine out of ten kilns burned by any process, I state, without fear of contradiction, that 90 per cent. of said kiln cannot be sold at any price. The arches were totally destroyed while the outer walls of the kiln were all sal-

mon color or not discolored, but almost as green as when placed in the kiln. A few common in centre of kiln were fair, with as many colors as Joseph's coat. These are facts that can be verified by hundreds of reliable men who have seen the handiwork of this noted expert.

ST. CROIX LAND LUMBER Co.,

E. S. AUSTIN, Gen'l Man.

The "Settling" Question.

Editor Clay-Worker:

I am in receipt of Clay-Worker for July, 1889. It presents its usual energetic life, enterprise and intelligence, as a leader in its line of journalism. There are no stale uninteresting articles in the Clay-Worker; while some of the writers show want of practical experience, still, they have something valuable to say. The clay industry is coming to the front, and will, ere long, present one of the largest fields for intelligent study, and for manufacturing industry.

With no desire to make invidious distinctions, I think the article of Prof. R. T. Brown, in your July number, is excellent. He is, however, like all other writers on the subject of burning clay, mistaken in the idea that all clays will shrink, under certain high heat in a kiln. He says: "But when the final equivalent of water is displaced, the heat has reached a point at which the material has become so soft, that when the water has been driven off, the space it occupies is closed and the whole size of the brick is diminished by that amount." And, further, that "this is seen in the settling of a kiln, and indicates the desired change in the chemical composition of the clay."

Prof. Brown stops right where all his predecessors have. Not a single writer on the subject of burning clays has ever got beyond the common hackneyed assertion that a brick kiln cannot be burned well and thoroughly without being settled. I am not sufficiently versed in chemistry to explain just how it is that certain kinds of clay will not fuse or shrink in any heat that can be made in a brick kiln, but that it is so, I assert from an extensive long experience in burning brick, at sundry times and places, as you will see from my first articles. I find that acids do not; to any appreciable extent, act on clays that are composed of pure silica and alumina, and that these clays are infusible, and cannot be shrunk by burning. In fact, most of them will swell under intense heat, especially when the silica is in ex-

cess of the alumina. I challenge all the professors and brick burners in the United States, to a practical test of my assertions. I will furnish the clay from different localities, or right here on my own place. If, after a test, I am right in my assertions, I want them to give me the credit of advancing in my line of experience, above all others. If I am wrong, I will modestly take a "back seat" and "hush up."

There is *nothing in technology* to rebut hard, well-tried experience. I yield the "sceptre" of the "*mud larks*" to no aspirant. I don't say that what I don't know of clay and brick is not worth knowing, for I believe it is the most subtle and difficult of all things to learn, and only claim to know it in part, but I will be a thousand times obliged to any man who can show as long and as varied experience in making and burning brick as I have had, and then candidly say, that I am not right in my assertions.

The great proportion of clay from which brick are made, will shrink in burning, and as it is a rare thing to find a brickmaker who has had experience in any other kind of clay, it is no wonder that the "settling" idea *caps* the knowledge of so-called experts, as writers, and burners. But I think the "*professors*" ought to show that I am wrong in saying that a certain kind of clay will not shrink in burning, or that I am entitled to the distinction of making a discovery. I hope Prof. Brown will honor me with an *open* letter on this subject.

There is an alluvial clay deposit within a quarter of a mile of my brick yard that will shrink in a brick kiln, just as Prof. Brown says. It makes an excellent red brick, and when put on top course of kiln at my yard, will melt and run down like molten iron. Such is the difference in clays. If Prof. Brown, will carefully look over my articles from first to third, in the Clay-Worker, he will see that I point out the natural localities and distinctions of the three great groups of clay: The *diluvial*, the *post or ante-diluvial*, and the *alluvial*, or in other words, the *primitive*, the *secondary*, and the *recent*. I find that the acids have very little effect on clay that will not fuse or shrink in burning, hence I conclude, that such clay is nearly pure silica. From this fact, our primitive clays here in the South, are especially good for all kinds of tile and pottery, as it does not warp or shrink in burning.

If the Clay-Worker can have a full and fair discussion on the peculiarities,

actions, and proper treatment and uses of clay, it will prove a general public benefit. Our clays here, containing a small amount of sulphur, iron and magnesia, are a sure cure for scrofula, or any kind of sores, when applied in a plastic state; hence, our springs, all coming from clay beds, are noted for health-giving effect. J. W. CRARY, SR.

Among the Queer.

Editor Clay-Worker:

Among the many queer things in locating brick plants was seen by the writer some days since. I will not mention where, or who, but describe briefly.

Two moderately young men of brilliant ideas in affairs with which they are familiar, contemplated going into the manufacture of street paving brick. They procured a fine bank of as good clay for the purpose as one would expect to see, together with an excellent outfit of machinery, and plans for the most improved kilns.

You will admit that the above is a queer thing for the novice to do. It was out-queered, however, in this instance, by the location selected for the plant. The location selected was on a fill made from bituminous coal screenings, and slack. This fill had been years in accumulating and had reached the average depth of from five to fifteen feet.

Now, imagine a kiln of paving brick raised to a white or settling heat, located on a foundation of coal such as described and you will have no trouble in calculating the settle in feet or cash.

THE NATIONAL MILITARY HOME,
LEAVENSWORTH, KANS.

Thinking perhaps your readers might be interested in what is being done at the home, in the way of brickmaking, I send you this brief mention.

The Home paving brick plant is now in full operation. The fourth kiln has just been emptied, and we are glad to report that every brick was found to be a No. 1, strong, vitrified paving brick.

For excellent paving brick this clay has no superior. It also gives a fine color and is well adapted to make fine front brick, or terra cotta.

If you desire to examine a model brick plant you can do so at the Home.

The work of constructing and operating is all done by the "old soldiers," who, I am glad to say, take as much pride in the plant as they did in "Sherman's March to the Sea," but, perhaps, with not quite so much alacrity.

To say that the "old soldier" at the Home won't work is a great mistake. One of them was seen laying brick on a kiln with one hand, while in the place of the other hand was a scraper attached to the stump of his arm on which to clean his trowel.

The managers are more than delighted with their success. Even their first kiln more than met their expectations, being a No. 1 kiln of paving brick. Mr. John, the Home engineer, has shown no little skill as a novice in brick yard construction. The plant is complete in detail and convenient. They have a full outfit of Penfield machinery and have thus far erected four Eudaly down-draft kilns.

For the present the entire output of the plant will be used at the Home, as several miles of streets and sidewalks are to be put in the coming season. The intention is, however, to sell brick to the general public later on.

Many persons are of the opinion that the inmates are compelled to do the work of the Home such as grading, paving, etc., etc., as well as running the brick plant. This is not the case. No "old soldier" is required to do any such labor. If he works it is voluntary on his part, besides his name is entered on the payroll and he is paid for his time in money. Again, the brick used by the Home is charged to the construction account and credited to the Home fund.

So you see the brick plant is only another of Gov. Smith's good business ideas by which he is enabled to give the inmates employment if they choose, and at the same time beautify and adorn the streets and sidewalks of the Home at a very moderate expense.

Every brickmaker who can will do well to pay the Home a visit. You will find the officers cordial and willing to sacrifice their time to show you all the interesting sight, which are many.

"A PATRIOT."

Why Is It?

Editor Clay-Worker:

I would be greatly obliged if you or any of your readers can answer the following question: Why is it that dry pressed brick made on the **** machine will not burn as well in down draft kilns as semi-dry pressed brick made on the ***** machine? On the up-draft kilns there is no such difference, or if anything, it is in favor of the dry pressed. In burning dry pressed in down-draft kilns here with experienced burners we can not get a settle on them and they

come out too soft although there is a good settling heat several days before closing.

E. E. L.

Near Chester, Ill.

OFFICIAL ANNOUNCEMENT.

Fourth Annual Convention of the National Brick Manufacturers' Association to be held in Philadelphia, Pa., Tuesday, Wednesday and Thursday, December 10, 11th and 12th, 1889.

As announced in the official report of the proceedings of our last annual convention, the next yearly meeting will be held in Philadelphia, Pa., Tuesday, Wednesday and Thursday, December 10th, 11th and 12th, 1889.

This time and place was chosen by the Executive Committee after carefully canvassing the matter several months ago, and meets with much favor from members of the craft generally throughout the country.

In as much as this is our first convention in an eastern city there will undoubtedly be a marked increase in attendance from the Eastern and New England States while the Western and Southern craftsmen having already felt the benefits gained from our yearly meetings will take advantage of the opportunity to visit and become better acquainted with the Eastern brethren and by personal inspection acquaint themselves more fully as to the methods of manufacture now in vogue there.

The brickmakers of Philadelphia and vicinity are now all members of our Association and heartily interested and identified with us in the work, thus assuring a most cordial welcome to every one who can meet with us.

It is with no little pleasure therefore that we announce that arrangements have been made for reduced railroad rates over all the leading lines in the Eastern, Central, Southern and Western States. A complete list of these lines will be given in the next issue of this journal together with the Programme which is now being prepared.

Anyone desiring further information as to the objects of our association with a view of becoming members will please address the Corresponding Secretary, Mr. Theo. A. Randall, Indianapolis, Ind., from whom also may be obtained copies of the proceedings of the last convention.

Respectfully,

THE EXECUTIVE COMMITTEE,

by R. A. SPEED, Pres.
T. A. RANDALL, Cor. Sec'y.



INDIANAPOLIS, IND., Sep., 1889.

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Subscribers when ordering a change of address
should give both the old and the new address.

ADVERTISING RATES furnished on application.

Correspondence on all subjects of interest to Clay Workers is solicited. Communications from practical men will always be welcome. Address all communications to

T. A. RANDALL & CO.,

14 & 16 S. Tenn. St., Indianapolis, Ind.

THE ART OF ADVERTISING.

It has passed into an accepted maxim that "printer's ink, in the commercial world is the ready means of acquiring a fortune." Taken without important modifications, this is not true, and may as often lead to failure as to success. Advertising is an Art, and like every other true Art has an underlying philosophy beneath it. The man who would advertise successfully must first know—WHAT TO ADVERTISE. If a man has anything to sell by the sale of which the public will be benefitted, as well as himself, it is not only his privilege but his duty to advertise it. Everything that a man has for sale, trade or barter, is a legitimate subject for advertising. If a man transcends this line and attempts to advertise what HE IS, or what HE DOES, he must move cautiously and guard his language well or he will be written down as an egotist by all sensible men and his advertising will injure rather than benefit him.

HOW SHALL WE ADVERTISE? This may relate to the manner of advertising or to the medium through which we propose to inform the public. As to the manner of advertising, the description of the subject of advertisement should be general, avoiding minute details. The language should be simple, clear and easily understood and above all qualities, IT MUST BE TRUTHFUL. Exaggeration, so frequently indulged in by advertisers has shaken the public confidence in advertisements to such an extent that much of the benefit of advertising is lost.

It is bad taste to present the article advertised in contrast with some other article of the same class already in the market. It has become quite fashionable to accompany the advertisement with a wood cut or picture of some kind. If such an illustration serves to make the object advertised plainer it is not only admissible, but every way proper, provided a neat clean cut can be obtained. In many of the advertisements that we see the picture is a disgrace and will repel rather than invite readers. The periodical press at the present time is the best medium for advertising, if not the only legitimate one. The judicious advertiser will look well to the character of the paper through which he proposes to reach the public. The extent of its circulation is generally the first consideration but it is by no means the most important. The class of people who patronize the paper must always be taken into the account. To make a proper selection at this point is perhaps one of the most difficult things in the art of advertising. Local advertising may be done by bills and posters, but this method cannot be depended on to convey the proper intelligence to the general public. It is indeed akin to the rather rude method of advertising by painting fences and logs by the wayside. The paper selected for advertising should be one that is read by persons connected with the trade in, or use of, the article advertised. There is a class of advertisers who seldom or never patronize the press. They take pictures or specimens of the articles they wish to commend to the public, or samples of the work done by the machine they wish to sell and personally present these to the customers they hope to secure as patrons of their enterprise. This class of advertisers are not all frauds but they are traveling in a path worn smooth by the feet of fraudulent speculators. Let the public, therefore, scrutinize such advertisers with due circumspection.

THE WORLD'S FAIR---HOLD IT AT CHICAGO.

There is quite a spirited rivalry as to the selection of the site for the World's Fair of 1892. At first, the City of New York seemed to take it for granted that the World's Fair could not be held successfully anywhere else than at that Metropolitan City. But Chicago steps promptly to the front and challenges a comparison of advantages making the following substantial claims:

1st. Chicago is geographically central. There is no place in the Republic which can be so easily reached by the largest portion of her citizens.

2nd. That the hotel accommodations are ample for the accommodation of all.

3d. That there is no city in the Union so popular abroad as Chicago. It is favorably known world-wide; it's rebuilding—rising out of the ashes—into such magnificent proportions is generally known over the European Continent.

4th. That there is no place where the industries of the nation will be so largely exhibited.

Chicago, yes Chicago; with her million inhabitants and characteristic enterprise is the place for the World's Fair. We hold up both hands for Chicago.

A NEW BOOK.

"A Treatise on Masonry Construction," by Ira O. Baker, C. E., Professor of Engineering, University of Illinois. This is a very valuable treatise embracing:

Building Stone—the requisites, classification and description.

Brick—Process of manufacture, requisite of good building brick, methods of testing, etc.

Lime, Cement, Mortar, Concrete, Artificial Stone, Quarrying, Stone Cutting, Stone Masonry, Brick Masonry.

Foundations—Ordinary and under water.

Masonry structures of all kinds.

This book is especially valuable, embracing in many particulars a new field in that it treats of well known subjects that have hitherto commanded but little attention. The matter is almost wholly new. The structures illustrated are actual ones. The volume is divided into parts, chapters, articles, sections, etc., making it an easy book of reference. We are especially pleased to commend this work to our readers, knowing as we do, the author personally as a painstaking, honest man with marked ability for the work so well done. The book is 8vo., of over 500 pages, bound in muslin.

For price, address John Wiley & Sons, Publishers, New York.

"Hints on Brickmaking" in this issue is an interesting and suggestive article that should receive considerable attention from every brickmaker. The intimation that the Lord and the executive committee of the N. B. M. A. are slow to impart desirable information to the members of that association is its only questionable feature. Brother Brick

should read the official report of the last convention. He will find the time and place of our next meeting announced in same and much valuable reading also.

We call special attention to the sixth paper on "Brickmaking and Burning," by J. W. Crary, Sr., which is given on a preceding page. Our readers will find it particularly interesting and suggestive we think. Indeed it is due to Mr. Crary to say that his series of articles, so far published in our columns, are valuable contributions to our clay working literature. They have the ring of practical experience and close observation—which goes a long way with thoughtful men. If any of our readers have neglected to read them, possibly for want of time, we suggest that they carefully preserve the numbers, a thing which ought to be done anyway, and read them when they have leisure.

Our readers will see by the "official announcement" on another page that the next annual meeting of the National Brick Manufacturers' Association is to be held in Philadelphia, Dec. 10th, 11th 12th, 1889. The selection was practically made at the Memphis convention and so far as we have heard any expression of opinion it gives general satisfaction. The craftsmen in the city of brotherly love will extend a right royal welcome. They well know how it is done; as we have had a foretaste of what may be expected we speak from a very happy experience. The craftsmen from all parts of the country should arrange to be in attendance and make the gathering an historic one meeting as we shall on historic ground.

FILLING THE WANT.

A subscriber at Fort Madison, Iowa, Mr. J. H. Einspajer, sends us a dollar to pay for the Clay-Worker one year for a neighbor, saying: "He has read a few copies of your journal and is so well pleased with it that he now wonders how he ever got along without it." Mr. Einspajer thus performs a kindly service for, and deserves the thanks of, both his neighbor and ourselves. We are indebted to many of our subscribers for similar favors. Indeed, we count ourselves especially fortunate in obtaining not only the good will but the active support of so many influential craftsmen. It is our earnest desire to merit the co-operation of our readers by continuing to give the craft a live, progressive organ, and in the future as in the past, no effort on our part will be spared to make the Clay-Worker a real *practical* help.

EDITORIAL NOTES and CLIPPINGS.

Newark, Ohio, is paving its streets with brick.

Dr. D. M. Houck, of the Chattahoochee Brick Co., has taken unto himself a wife.

The Steelton (Pa.) Brick Co. has been chartered with capital stock of \$10,000.

J. L. McWilliams and Geo. W. Ethridge propose starting a brick yard near Daleville, Tenn.

The Buffalo (N. Y.) Star Brick Co. has doubled its capital stock and will enlarge their plant.

The Phoenix Brick Co., of Cleveland, Ohio, has been incorporated. Capital stock \$40,000.

The Fairfield County Brick & Tile Co., Lancaster, Ohio, has been incorporated. Capital \$12,000.

W. B. Jopling, a well known brick-maker of Augusta, Ga., died in that city on the 28th ult.

The Union Brick Co.'s works near New Cumberland W. Va., were burned recently. Loss \$10,000.

The Memphis Brick & Mfg. Co.'s works were partially burned recently. Loss \$5,000. No insurance.

S. D. Gorman is prospecting for suitable clay for sewer pipe with a view of building works near Jackson, Tenn.

The Union Fire Clay & Stone Co., Coleman, Columbia Co., O., has been incorporated. Capital stock \$10,000.

In a brick-tossing contest at Chester, Pa., two men tied, each unloading a barrow of eighty bricks in fifty seconds.

The Portsmouth (Ohio) Fire Brick Works will put in additional machinery, etc., to increase their capacity 50,000.

If you are seeking a position or want experienced help, read or advertise in our "For Sale, Wanted, Etc.," columns.

The Puget Sound Fire Clay Co., Seattle, Wash., has been incorporated by Chas. L. Denny and others. Capital stock \$100,000.

H. P. Spencer and J. P. Hazelton have organized a company and will build large fire brick works near New Straitsville, Ohio.

The works of the Whittaker Pressed Brick Co., at Vance, near Kansas City, Mo., were burned Aug. 26th. The building and machinery were destroyed, causing loss of \$10,000. Insurance \$4,000.

The buildings of Hammond & Shallcross' pottery at Northeast, Cecil Co., Md., were destroyed by fire recently. Loss \$4,000. Insurance \$2,000.

The Texas Fire Brick & Tile Co., Athens, Tex., are considering the feasibility of increasing their capital stock to \$100,000, and enlarging their works.

Taplin, Rice & Co., Akron, O., have favored us with a copy of their new catalogue of Clay Working Machinery. It is a neat little book. Write for a copy mentioning the Clay-Worker.

D. P. Montague, D. J. C. Chandler and others, are arranging to establish an extensive brick plant in the vicinity of Chattanooga, Tenn., about \$20,000 will be invested in machinery, etc.

The Nebraska City (Neb.) Paving Brick Co. are now making eighty to ninety thousand brick a day. They are thinking of putting in a tile machine as they think their clay especially adapted for tiling.

The Windsor Roofing Tile Co. has been organized by T. W. Carmichael, of Wellsburgh, W. Va., and others, with capital stock of \$10,000. They intend to build roofing tile works near Short Creek, W. Va.

The Pueblo (Colo.) Brick & Tile Co. are putting in an Iron Clad Brick Dryer, of 50,000 a day capacity. The demand for their brick is beyond their present capacity. They recently booked two orders each for 1,500,000 brick.

The proposed purchase of the Detroit brick yards by an English syndicate has been completed and every yard of any importance in and about Detroit will soon pass under the control of foreign capitalists, at least so says the *Free Press*.

It is reported that the Elgin (Ill.) Brick & Tile Co., will sue Mr. D. H. Heager, of Dundee, Ill., for \$20,000, for alleged failure to consolidate his business with that company's as agreed upon. Mr. Haeger has three large brick and tile plants in that section.

L. M. Temple, postmaster at Hammond, Ill., writes us that he thinks there is a good opening there for the establishment of a tile factory. Mr. Temple will be glad to correspond with any reliable party seeking a desirable location for such a plant.

Chas. Kaestner & Co., of Chicago, Ills., are furnishing the complete equipment for a new pressed brick plant now being put up by the New York and Tacoma

Brick Works at Tacoma, Wash. Ter. A three-mould Brewis Patent Press, a Raymond Clay Pulverizer, Elevator and Screens and a pair of clay crushers will be used.

Chas. D. Colson, of Chicago, in renewing his subscription adds: "I have been in the brick business over twenty-two years, in England and America, mostly as foreman, yet, with all my experience, I find the Clay-Worker very helpful as well as interesting and always look forward to its coming with pleasure.

Wm. Sondermann, of Hastings, Minn., having noticed the appearance of gold in a kiln of brick opened in his yard recently, had a sample of the sand analyzed by a St. Paul chemist with the resulting discovery of "pay dirt" to the value of \$6 to the ton. The expense of working the bed is comparatively nothing and Mr. Sondermann will seek wealth in the sand.

Our readers will observe by referring to Mr. Alfred Crossley's advertisement on page 190 that he has removed from Iron-ton, O., to Chattanooga, Tenn., where all communications to him should be addressed. Mr. Crossley has accepted a position with the well-known firm of Montague & Co., of the latter city. We wish him much prosperity and many friends in his new home.

M. L. Elsemore, Sec'y of the Hastings (Neb.) Dry Pressed Brick Co., in remitting their subscription adds: "We now have a daily capacity of 40,000 dry pressed and 200,000 common brick using the Improved Eureka Dry Press for the former and Penfield's No. 4 single worker for the latter. Have demonstrated that dry pressed brick can be made from Nebraska clay. Our color is a deep red."

The Eureka Brick Machine Mfg. Co., of St. Louis, Mo., are out with a neat four-page circular inviting all who are interested in bricks and brickmaking to visit the St. Louis Exposition, which is now open and runs till Oct. 20th, and view the "Eureka" in operation. One of their largest machines will be under belt during the exposition. Any of our readers wishing to test their clay on a dry press machine can do so free of charge by bringing to the exposition about fifty pounds of clay.

C. & A. Potts & Co. report trade exceedingly good for month of August, their shops having been kept running full time. They have delivered to one firm at Portland, Oregon, eight disintegrators and to another at Seattle, Wash. Ter., four disintegrators, four pug mills, one horizontal stock brick machine and sander. A complete outfit—brick machine, etc.—to Lancaster, N. J., and four sanders to one firm at Buffalo, N. Y. The demand for their sanders has been immense, making it very difficult for them to keep up with orders.

Fate & Freese, Plymouth, Ohio, are having a greatly increased trade over that of former years. In addition to their usual good trade on tile machines, they have paid special attention to the growing demand for Stiff Mud Brick

Machines, and to meet this demand they have placed on the market their A and B Machines which are stronger and have a much larger capacity than would be required for tile only. Their lubricating brick dies which are of a new and original design, they claim will produce perfect brick out of any variety of clay from which brick can be made. They have a large demand for their Revolving Tables for cutting end-cut brick and drain tile. For side-cut brick they have placed on the market a Board Delivery Table. By the manipulation of one lever 12 brick are cut and delivered on a pallet board ready to place on off-bearing trucks. These tables differ from other similar tables in that they cut no waste ends and are more easily operated. This firm will exhibit their machines at Pittsburgh and St. Louis Expositions and Indianapolis Fair, which will afford an excellent opportunity to see these machines in operation.

NEW INVENTIONS.

The following is a list of patents appertaining to brick, tile, terra cotta, sewer pipe, pottery, etc., and the machinery used in their manufacture issued since our last number: (A copy of any of them can be obtained by sending 25 cents, the official price, to Chas. E. Brock, Patent Attorney, 925 F St., Washington, D. C.)

- 408,213. Brick Mold—E.B. Carter, Huntsville, Ala.
- 408,337. Clay Working Machine—W. Cunningham, Frankfort, Ind.
- 408,860. Burning Clay for Ballast—J. Stubbs, Fairfield, Iowa.
- 409,348. Brick Machine—W. Cunningham, Frankfort, Ind.
- 409,593. Brick Machine—Kirk & Horton, Wellington, Ohio.

409,186. Machine for Separating Gravel from Clay (two patents)—S. Friend, Decatur, Ill.

409,948. Brick Drying Pallet—C. Fitch, Elizabeth, N. J.

409,988. Brick Machine—Geyson & Thomas, Rochester, N. Y.

HARVEST EXCURSIONS VIA VANDALIA LINE.

September 10, 24 and October 8, to points in Missouri, Arkansas, Texas, Kansas, Nebraska and other States and Territories west of the Missouri River. ONE FARE for the round trip, tickets good 30 days. Accommodations in reclining chair cars FREE from Indianapolis. The reputation of the Vandalia Line for providing superior accommodations, for safety and punctuality, makes any further recommendation unnecessary. For rates, maps and information apply to Geo. Rech, Ticket Agent, Vandalia Line, Washington and Illinois Sts., or to the Vandalia agent, opposite Union Station, or address

H. R. DERING,
Assistant General Passenger Agent, Vandalia Line, Indianapolis.

HARVEST EXCURSIONS.

The Pennsylvania Lines Will Sell Cheap Tickets.

On September 10th, 24th and October 8th, 1889, the Pennsylvania Lines West of Pittsburgh will sell excursion tickets, at one fare for the round trip, to principal points in the Northwest, West, Southwest and South, good returning thirty days from date of sale. For full information apply to the nearest passenger or ticket agent of the Pennsylvania Lines.

AN ACROSTIC.

In anticipation of an immense crowd at the Near approaching Fair, Sept. 23-25, the Board is Doing everything possible to accommodate, by Increasing the facilities in all Departments, Averting the "jam" incident to some former years. No expense has been spared, and the Directors Announce that for the exhibition many Specialties have been secured which will be a Treat to old as well as new patrons Attending the annual festivities for 1889. The indications to date are flattering, the Entries being far in excess of any Former exhibition under the Board's auspices. Among the features skilled lady riders will Indulge the visitors at intervals, while the Railroad rates will be unprecedentedly low.

OUR 1889 CATALOGUE

Is in Printer's hands. Parties desirous of obtaining same will please forward their address at once

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prompt mailing. Address,

Link-Belt Machinery Co.,

CHICAGO & MINNEAPOLIS,

—OR—

Link-Belt Engineering Co.,

NICETOWN, PHILADELPHIA, PA., &

[Mention the Clay-Worker].

40 DEY ST., NEW YORK, N. Y.

THE CLAY-WORKER

VOL. XII.

INDIANAPOLIS, IND., OCTOBER, 1889.

No. 4

Written for the Clay-Worker.
**EXAMPLES OF AMERICAN BRICK AND
 TERRA COTTA WORK.**
 No. 20.

**THE MANHATTAN ATHLETIC CLUB-HOUSE,
 NEW YORK CITY.**

Plans for the finest athletic club-house in the world have been drawn by order of the Board of Governors, of the Manhattan Athletic Club, of this city, by P. J. Lauritzen, architect. In its appointments and æsthetical luxuries it will be a dream that would have delighted the effete emperors of ancient Rome. By the first of next January an edifice of noble proportions, and adding to the architectural beauty of Madison Avenue and Forty-fifth Street, will be completed, and the marble stones in front of it on the sidewalk will have these words chiseled thereon: "Manhattan Athletic Club." The facade of the building will be imposing, and the general architectural design of the Renaissance period, dashed with a little flamboyant Gothic. But the beauty of the exterior will not compare with the elegance and the refined sumptuousness of the interior. The confirmed sybarite, the hardened athlete, and the refined scholar, will find a paradise within the various apartments fitted up for the pleasure and benefit of the members. The basement and first story will be of Seneca and Carlisle red stone, the upper

portion of pressed brick with terra cotta trimmings.

The building and everything complete will cost \$600,000. An unusual and interesting feature of this club palace is one of the largest swimming baths in the world. It is located in the basement and will be 100 feet long by 21 feet wide, and

the water. At various points comfortable little climbing-out places will give the swimmer an opportunity to leave the water without disturbing others who may be enjoying the plunge. The facilities for approaching and leaving the bath will be unexcelled. The shooting gallery is to be in the basement also, and will

have a range of 135 feet. Excavations will be made under the sidewalk to permit the range to be ten feet longer than the building. The crack shots of the club will have a chance to practice night and day. Electric lights will keep the range as light as day. Besides these, six bowling alleys will occupy the last available space in the basement. Many of the club members are fond of bowling, and the alleys will be models of their kind in every respect. They will be erected with a view to permanency, and will be so smooth, level, and substantial that time and use will not put them out of plumb a hair's breadth. All the balls and pins will be made by special contract. In all other respects the building will be constructed and furnished

in a like manner, no expense being spared to make it an attractive and elegant home for the members of the club for whom, 'tis said, the best is none too good.

Unless all signs fail, it will be the boss club-house of the world.



THE MANHATTAN ATHLETIC CLUB HOUSE.
P. J. Lauritzen, Architect.

will be kept constantly filled with clear, pure water. It will be a liquid pool in marble. An ingenious and artistic foot-board called the leap, will be erected at the end of the bath to give the more adventurous of the members a chance to leap high and descend gracefully into

Written for the Clay-Worker.

BRICKMAKING AND BURNING.

No. 7.

BY J. W. CRARY, SR.

In my last article, No. 6, I showed the difference between burning soft tempered clay brick and brick made of comparatively dry pulverized clay, under heavy pressure. As there are many who do not understand why all kinds of clay may be pressed into a brick without cracking, when it is dry and well pulverized, while perhaps the same clay will crack by hot sun drying, or in a dryer, I will repeat what I have before said, that all clays of a mealy or limy character, will crack in drying, unless dried very slow. But such clay could be dried on dryers if put on pallets and the dryer closed steam tight, and then kept full of steam until the brick would be heated clear through; then the steam turned off and hot air, about 212 degrees Fahr., turned in on the brick. It is obvious that the brick would not crack by exposure to steam, as that would slightly expand the brick and of course there could be no shrinkage of the clay until the steam would be turned off. Then if dry heat were turned on the brick no greater than the heat inside the brick, it would only aid and hasten the evaporation of the hot water inside the brick. The surface would not contract but very little faster than the center of it, because the steam inside would keep the pores open and the shrinkage would be thus equalized and as soon as the steam would be out of the brick, the whole body of particles of clay would assume at once their (crystallized) form and a compact mass, unchecked and without crack would be seen.

Now here is the proof of this thing, and I want the old brick burner who generally knows all about the effects of what he does, while not one in fifty of them knows, or ever studies the causes, to mark well my statement here. You know that when you set fire to your kiln you must necessarily go slow, first, because you cannot make a fire go fast as you have no draft to make your fire burn. Second, you know that if you fire too fast you would get up such a hot steam that the brick would get soft and "water-settle," but with slow firing the brick become saturated with steam so, as the dry heat follows after, the steam escapes without cracking or water-settling the brick, and the dry heat naturally takes the place of the steam heat without disturb-

ing the cohesiveness or crystallization of the clay.

THE REASON WHY THERE ARE SO FEW SCIENTIFIC BRICK BURNERS.

What are termed the learned "professions," are acquired, held and practiced, because all have certain fixed formula and principles laid down and recognized as paramount in the use and administration of any particular science. No one would be tempted to practice a science contrary to established principles. There may be novelty in the practice, but the principles must remain intact. Not so in brick burning and making: It is all "hotchpoch" or "hotch pot," as lawyers say, with brickmakers. The public have never asked or deemed it necessary to have a perfect brick made and burned on scientific principles. As a rule, when a job of brick work is to be done, estimates are called for to be made on certain plans and specifications, and the terms "good building brick," "good hard brick," "mercantile brick," or "well burned brick," are employed, without any special or particular qualifications. These terms in common technical parlance, means, that as good brick as is made in the localities where the work is to be done, or in the market, should be used. The very best in the market may be very bad or imperfect brick, but the builder says, a brick is a brick, and the architect has no formula for a good brick, and many of them do not know a perfect-made and burned brick from an imperfect one, made from the same clay. A brick may look well on the surface, but when broken across the middle, may show only a crust of half an inch that is well burned, which shows that the heat necessary to burn a brick perfectly, was not continued long enough to make a uniform hardness, and as most brick is made of clay that will shrink under certain degrees of heat, of course, the surface of the brick being harder than the inside, there is an unequal contraction throughout the body of the brick, and the outside is on a strain or sort of tension over the inside, so that a light stroke or uneven pressure will break the brick. It is safe to say, that more than half the brick made and burned, are thus imperfect in the quality of strength and yet we have no fixed rules for judging a brick. We see tabular statements of the strength of bricks to resist pressure, etc., but little or no reliance can be placed on them, as two brick of the same clay and external appearance, may vary in power of resistance to certain given forces, as two or three to one.

The highest possible proof that brick is the most superior building material in the world is the fact, that outside of an occasional job of public brick work, the entire brick work of the whole world is imperfect in all respects excepting, perhaps, the purpose and plan of the work, and yet brick are preferred to all other materials for building. Brick can be so made and burned, and then put together with cement, that after a year or more, the mass in any shape would be equal in strength to any kind of stone, and far superior when exposed to frost or fire, yet, as imperfect as our brick work is, it is the first and foremost in real economy and durability. A demand for a standard perfect brick will give us perfect burners.

So long as the general public are satisfied with all sorts of brick there will be all sorts of brickmakers and burners, but once fix a scientific standard for brick, and that will produce the men of talent and capability to produce brick. Supply and demand are the omnipotent regulators of the whole business of the world. If the option is with demand and he don't get the best that is made it is his own fault. Brickmaking has been regarded as a sort of a mean, dirty business, followed only by ignorant, vulgar mud larks, ready for a "tough and tumble" tussel at anything; but the art is coming up. Capital and brains must go together to win, and the demand for intelligent brickmakers and burners, will induce young men of fitting capacity to engage in the art with a purpose to master all its intricacies, and understand its various phases. A first-class expert, scientific brick burner, or clay worker of any kind, will take rank in the front of all the mechanical and skilled pursuits. I doubt not that a sort of a university, or school for the practical and theoretical training of the right kind of young men in the clay working arts, would be a great success, and would result in very great improvement to the real economy, efficiency and durability of our best building industry. We want more clay work and less wood work; we want more single tenements, and broader and longer streets to make our cities more healthy and moral. Our rapid transit and facilities for cheap and easy transfer of goods and people, have effectually disposed of the need of narrow thoroughfares, little lots, and high and massive buildings. Fire, health, morals, comfort and all, demand a radical change and it will come.

A brick building for any purpose is much the cheapest in the long run. I have built houses with six rooms with 25,000 brick. I put the outside course of brick as usual, on "the flat," and set the inside on edge, leaving an aperture of nearly two inches between the brick on edge and outside course. Every 6th course is a "header," or bond course. This wall has two great advantages. First, it is about twenty per cent. cheaper than a solid wall of the same thickness, and just as strong. Second, and yet more important, the hollow, or aperture, is a perfect non-conductor of heat and cold, as well as of dampness. No "furring" is necessary, both "stripping and lathing" is saved and less mortar and a better job of plastering is done, and no "burrow" for mice, or bugs is left, and the liability to fire is lessened. A brick house built two stories high on this plan, is as cheap as a frame house, if the frame be done in first-class style of workmanship and material. I have said nothing of the difference in *insurance* and durability. When all advantages are considered, it is a wonder that brick are not used almost exclusively as a building material.

The old prejudice against brick walls, which is mere superstition, would be disposed of by my plan, everybody could have a cheap, warm, strong, dry, house to live in, and not pay a cent of royalty, as I have built these kind of houses thirty years ago, and don't propose to patent them, beyond the *copyright* of these articles.

[Copyrighted.]

Written for the Clay-Worker.

SEWER PIPES AND THEIR MANUFACTURE.

BY ALFRED CROSSLEY.

[CONTINUED.]

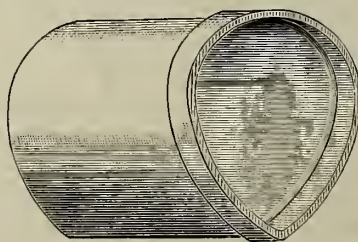
I have heretofore remarked that sewer pipes may be correctly regarded as a coarse stoneware. But the ordinary stoneware body would not do for sewer pipes. It is much too fine for the thickness required in sewer pipes, and would be liable to crack and warp in drying, blister in burning, and air-shake in cooling. Nevertheless we retain the distinguishing characteristics of stoneware, viz., a vitrified body covered with a salt glaze, and so long as these are present we have a true stoneware. But with this in mind it is probably safe to say that not over one-half of the sewer pipes made, either in England or America can be classed as stoneware. In England I know this to certainly be the case. And

yet the manufacturers do not hesitate to perpetrate the transparent fraud of advertising their pipes as "stoneware." The reason for this is that the first development of this industry was in a stoneware body. Afterward came the use of fire clay, in the use of which was less liability to risk and loss in manufacture. These fire clay pipes are burned at a high heat and take a heavy salt glaze, but as I have said, many firms adopted the title of stoneware for these fire clay pipes. Although, as I have said, very well glazed, the body was not in the least vitrified, being made of fire clay of too pure a quality. Hence their unsuitability, for sewage purposes. A glaze, however good, is not sufficient of itself to render the pipe impervious. I have demonstrated this myself by putting water in a well glazed fire clay vessel, alongside a stoneware vessel with the same quantity of water in, and while the water in the latter was retained, in the fire clay vessel it would gradually make its way through. On this subject, another writer has said: "A nice looking glaze, however, is not always proof of a good, sound pipe; in fact some of the most porous and friable clays take the best glaze, and some again are easily affected by acids and other chemical substances that are to be found in sewage. This is a fatal weakness, since the chief merit, of the stoneware pipe is its resistance to the influence of practically all acids in sewage, which on the other hand are so fatal to metal pipes of all kinds." Although, as I have said, the use of this class of pipes, on account of its fine glaze and appearance, has been allowed, the engineers have recognized a difference in strength, in the fact, that while the thickness of stoneware pipes is specified at one-twelfth the diameter, the thickness of fire clay pipes is required to be one-tenth the diameter. I have been informed, however, that in the last few years there has been a gradual reaction in favor of the genuine stoneware pipe. The most absolutely perfect sewer pipes that it has ever been my privilege to see were the stoneware pipes of Doulton & Co., Lambeth, London. In this country there have been and are still, large quantities of sewer pipes made that are not vitrified. If I am not mistaken the bulk of these are to be found at the Eastern factories where the Albany slip glaze is chiefly used. Of this I will speak further a little later. Inferior fire clays, as already described, suitable for sewer pipes, are found in Hancock Co., W. Va., Jefferson Co., O.,

Akron and New Lisbon, O., near St. Louis, Mo., and other places, and hence the location of the industry on a large scale at the points mentioned. Those made in the Akron district are of exceptionally good quality and deserve to be specially mentioned. It can hardly be gainsaid that they are the best in this country. Any one of several reasons may be sufficient to render a clay unsuitable for sewer pipes. It may be too weak in the fire, that is, it may vitrify too quickly, and hence either melt down entirely before salting heat is reached, or if it retains form sufficient to take glaze, it may still be worthless, as the nature and strength of the clay is all burnt out. I know of no remedy for such a clay, except—not to use it. On the other hand the reverse may be true, as already spoken of, where the pipe although well glazed is not vitrified. This may be remedied by thoroughly tempering the clay and thoroughly mixing with it one or more weaker clays, in proportions to be determined by experiment. Then we may find a clay that will crack and warp, or contract too much, hence having a liability to "spring" in the joints of branches, etc. This may be remedied by a mixture of other clays or by the mixture of one-fourth to one-half of calcined clay. Again, another clay may be in most respects well adapted but may refuse to take a good glaze. The reason for this, I am not enough of a chemist to determine, but think it may be due to a deficiency of silica in the clay, though I presume there may be other reasons. M. White, of Fort Dodge, Ia., writing on this subject says: "I know by practical test that not all clays will take a salt glaze, no matter how hard the burn may be, or to what height the heat may be raised. Some clays will either melt or almost burn up, and yet take no salt glaze. One reason for some clay not taking salt glaze is that it contains too much lime, iron and sulphur." I think Mr. White is right as to the lime and sulphur, but cannot agree with him as to the iron. In fact a clay may contain so much iron as to spoil it for sewer pipes, coming out in very fine pimples, like a rough rash all over it, and yet take a good salt glaze. This may, perhaps, be a proper place to give some specific description of both slip and salt glazes, and why I give my opinion in favor of the latter. What is known in the trade as "slip glaze" or "Albany slip" is a mixture of clay and water, the value of the clay for this purpose depending upon its im-

purities, viz., iron, lime, magnesia, soda, potash, etc. These are its fluxing properties, which cause the slip to run when under fire and form a coating of impure glaze or gloss upon the ware. Salt glaze is formed by the combination of the soda of the salt with the silica of the ware itself, forming a pure gloss which becomes as absolutely a part of the ware as the clay in the body of it. The salt being thrown into the kiln when the heat is at the right point, is vaporized or volatilized, and is quickly decomposed by the steam and smoke into hydrochloric acid and soda, which, uniting with the silica of the burnt clay forms a silicate of sodium or soda glass, covering every portion of the wares exposed in the line of draught. As another writer has said: "It requires good clay to endure heat of sufficient intensity to vaporize the salt, and this heat is so great that the pipes are vitrified and very hard, and glazed inside and out." I have intimated a superiority of the salt glaze over the slip glaze. In what respect does this consist? The salt glaze, as I have shown, is absolutely part of the pipe itself, and without the silica contained in the clay could not be formed. The slip glaze on the other hand is a glaze of *itself*, independent of the pipe which it covers and although in fact, as a rule, *adheres to* the pipe is not *part of* the pipe, and hence there may be conditions in which the glaze would become detached from the pipe, as in fact I have occasionally seen in imperfectly burned pipes. Then in the salt glaze, if good sewer pipe clay be used it is an impossibility to glaze the pipe without also vitrifying, or at least semi-vitrifying the body. In slip glaze the opposite is true, it may and does often happen that the heat may not be sufficient to vitrify the pipe, and yet the slip be run. An inspector in the Brooklyn (N.Y.) Health Department, in writing on this subject claims as an advantage for the slip glaze pipe, that the parts to which cement is to adhere (viz., the inside of the socket and about two inches of the spigot end of the pipe) can be wiped off after being taken from the (glazing) bath, so that a porous condition can be preserved at the jointing point. Now, although this may in one sense be an advantage, yet it is contrary to the principles I have already named to have a sewer pipe porous in any sense or degree. If the principles as I have stated them be true, and the conclusions drawn from them correct, then we are compelled to admit that the evidently most proper

and suitable glaze for a sewer pipe is the salt glaze. It makes the most perfect and homogeneous glaze, and is besides, where a proper quality of clay is used, a sure and reliable index to the quality of the pipe itself. As before stated, when the pipe is made of a proper quality of clay, it is impossible to give the pipe a salt glaze without raising it to a sufficient heat to insure its vitrification, and hence when a salt glaze pipe is only partially glazed it is almost certainly non-vitrified if not soft, and should be rejected for sewage or water works use. A salt glazed stoneware pipe carries its character on its face. Some remarks as to shape, sizes, lengths, and other mechanical features of sewer pipes may perhaps now be in order. The ordinary and usual shape of a sewer pipe is round or circular. This remark may be considered by some of my readers as superfluous, inasmuch as they never saw any that were any other shape than round, except by accident. And so far as I am informed none but circular pipes have been made in the United States. And if I were a manufacturer I should wish there never would be any other shape except at a large advance in the price. But in England oval or egg-shaped pipes have also been largely made, though within the past few years the proportion of egg-shaped pipes in use has become much smaller. Below is a cut of a pipe of this shape.



Up to a few years ago every extensive firm made both shapes of pipe, but now some of the largest factories have not an egg-shaped die about the place and in fact do not pretend to make them, while those firms which do make them, do so principally to order only.

The principle of the egg-shaped pipe is scientifically a good one. It is well-known that the deeper the flow of sewage the less likelihood of its solid particles being deposited, and thus accumulating. In this shape of pipe when the volume of sewage running is reduced, it is contracted into a much narrower channel than in a round pipe, and hence the flow of its solid particles is facilitated. Another point of advantage is that the egg-shaped pipe will sustain a greater crush-

ing weight than the round one. Nevertheless the egg-shape has been gradually superseded by the round, and in this country has not gained a footing and I suppose that for no other reason than that a good round pipe practically answers all requirements made of it, and is besides so much more convenient to every one concerned.

The principal sizes in which sewer pipes are made, are from 3-inch to 24-inch in diameter, with several of the intervening sizes omitted. After leaving 12-inch the sizes generally increase by steps of three inches at a time; 7-inch pipes are seldom made, and 11-inch I think never. Two-inch pipes are also made by most firms, but in my opinion their use should be entirely prohibited, except in some cases where they may be useful for conveying fresh water supply, and even then I would say use a 3-inch pipe. One thing I am confident of, two-inch pipes are of no benefit to the manufacturers, for they cost practically as much as 3-inch, while for any kind of sewerage purposes it is a waste of time and money to put them down. Sewer pipes are also made in larger sizes than 24-inch, but to a limited extent. A few firms make also 30-inch to 36-inch, and in some cases even as large as 48-inch. This is the largest size I ever saw, and if I am not mistaken the largest that have ever been made for actual use in sewer construction. The manufacture of pipes beyond 24-inch or 30-inch diameter is attended with some difficulties. A clay pipe four feet in diameter, even after it is burnt, is not one of the handiest things to fool with, and the difficulty, care, and risk attending the handling of such a pipe from the time it is made by the machine to being safely set in the kiln may be imagined. I believe the Laclede Company, of St. Louis, claim to have made a pipe 6 ft. 6 in. or 7 ft. in diameter, but in the absence of any positive testimony, I cannot believe that such a pipe was ever made by the machine, dried in the shed, and from there set in the kiln, nor do I believe that with any appliances hitherto invented, the manufacture of pipes of such a size for regular sewerage use is at all practicable. I do not doubt that the company may have made such a pipe, but if so it has been built up by hand, in the kiln, left there to dry, and never moved till after being burnt, and its use has been intended for show or advertising purposes.

The best and most suitable length for sewer pipes is a matter of some impor-

tance. In this country, all sizes, are, as a rule, made in two-foot lengths, to which there are but few exceptions. Is this length sufficient? I think not. It will be hardly disputed, that from the standpoint of the sanitary engineer, sewer pipes should be made in as long lengths as possible (that is, as a rule), so that the number of joints may be reduced to a minimum.

In the early part of this paper I referred to a reported attempt to make pipes 5 feet long. I have no idea that any sewer pipe maker in America is going to waste any money over any attempt to do such a thing, but for pipes of 21-inch diameter and upwards such a thing would be highly desirable if practicable. But is there any necessity to make pipes as short as 2 feet? In Germany all pipes are made 3 feet in length. In England they are made in 2 feet lengths up to 9 or 10-inch, and some makers up to 12-inch. Above that they are made in 2 ft. 6 in. and 3 feet lengths. In Scotland the Garukirk Company make 2-inch and 3-inch pipes in 2 ft. or 2 ft. 6 in. lengths, and all over 3-inch in 3 ft. lengths. There is an objection, however, to making small size pipes over 2 ft. in length, as above that they are liable to become crooked in burning. My idea would be as follows: All sizes up to 6-inch or 8-inch in 2 ft. lengths, from that up to 12-inch in 2 ft. 6 in. lengths, all over 12-inch in 3 ft. lengths, and in the very largest sizes 4 or 5 ft. lengths if possible. Or drop out the 2 ft. 6 in. lengths altogether, and make all over 8-inch in 3 ft. lengths. I am certain that the manufacturers would find it to their interest to adopt this, as it would increase the product of the machine or pipe press. By making pipes 3 ft. long they would only have two-thirds the number of sockets to make, and as it takes nearly as long to make a socket as to make the pipe itself the advantage must be apparent, besides the mining, grinding, and tempering of the extra clay used in these surplus sockets.

[To be continued.]

A Foregone Conclusion.

Canvasser—I have here a work—

Master of the House—I can't read.

Canvasser—But your children—

Master of the House—I have no children (triumphantly). Nothing but a cat.

Canvasser—Well, you want something to throw at the cat. (He took it.)—*Life.*

BRICK STREET PAVEMENTS.

[The following extracts have been condensed from a paper by Mr. Edgar Ryan published in the Michigan Engineers' Annual.]

Clay, to make good paving brick, should be able, without fusing, to withstand a sufficient degree of heat, and for a time long enough, to render the brick hard and impervious to water. Fluxing agents are also necessary to render the brick homogeneous and tenacious. Among the clays that have been used more or less successfully for paving material, and the firms manufacturing them, may be mentioned the following:

The clay from which the Hayden Paving Block is manufactured is a "Mingo" fire clay, from Haydenville, Ohio. This clay has nearly the compactness and density of fine-grained sandstone, and yet is semi-plastic. Nitroglycerine is used in mining it, but it is easily reduced to powder in the dry-pan under heavy rolls, and when ground it mixes easily, works smoothly, and resists great heat. The paving block is burned for ten days in a temperature of 2,000° Fahr. This block is square in plan, 5½ inches on a side, and 4¾ inches deep; it is hollow below, to facilitate burning and to save material, and has a flat upper surface broken by indentations to provide a firmer foothold for horses. These indentations, however, are of little value as they are soon obliterated under heavy travel. The blocks are salt-glazed, and the outer top edges are slightly beveled to admit of a filling of sand, pitch, or other material. One thousand blocks will lay 29 sq. yds. at 50 cts. per hundred, or \$1.92 per sq. yd. A block weighs about 9½ lbs. or 360 lbs. per sq. yd. An analysis of this clay was made by Prof. E. M. Reed, and it compares with the famous Stourbridge clay of England as follows:

	Mingo Fire Clay per cent.	Stourbridge Fire Clay. per cent.
Silica.....	72.24	73.82
Alumina.....	16.87	15.88
Iron	0.16	2.95
Lime	4.20	trace
Magnesia.....	trace	trace
Alkali.....	1.09	0.90
Water.....	5.44	6.45
Total.....	100.00	100.00

The paving brick clay of Virden, Ill., is found in a bed 25 ft. thick, just below a stratum of slate and 275 ft. below the surface of the ground. It is compact, with a distinct cylindrical cleavage, of a light steel-gray color, and when first mined emits the characteristic odor of slate. It is blasted, but can be reduced to an extremely fine powder, free from grit. It has a specific gravity of 2.5595.

A piece of this clay can be kept at a white heat in a hard coal fire for twelve hours and not disintegrate.

The clays used at Bloomington, Ill., are surface clays of three varieties, *A* is a yellow, aluminous clay, very fine and plastic, and is found 3 ft. below the surface in a bed 12 ft. thick. It is simply tempered in a pug mill and burns to a grayish-red color. *B* is a hard-pan clay lying just beneath *A*. It is very troublesome to reduce to an impalpable powder. When dug, and left "to weather" for one winter, it gives good results. It burns from pink to cream in color. *C* is a blue clay from under *B*. It is fine, firm, very tenacious, and burns to a chalk white. In some respects it is similar to the light-blue fire clay at Empire, Ohio.

The experience of the best makers of paving brick leads them to conclude that fineness of grain is most essential to good results, but the clay must first be reduced in a dry state to an impalpable powder. Clay of the desired composition, but neither dry nor fine, may be calcined and then finely ground. This grinding is very essential in reducing the amount of heat required to vitrify it to a homogeneous mass, and the finer it is ground the stronger and harder will be the brick and the better it will stand abrasion. We quote other portions of this paper, as follows:

"At Nashville, Tenn., are used creosoted or bitumenized bricks, prepared by saturating common kiln bricks of medium hardness, under a high degree of heat, with liquid pitch, obtained by distilling coal tar. These bricks have been laid about four years, on a good foundation of rolled macadam, bedded on edge in 1½ inches of sand, and rammed tight. They have been subjected to a considerable amount of traffic, and show very little if any wear. The cost was \$1.80 per sq. yd. for brick and laying on finished foundation.

"At Youngstown, O., fire-brick on cement concrete base and sand with pitch in joints, cost for all \$1.73 per sq. yd. Their best bricks came from Empire, O., and New Brighton, Pa.

"At Allegheny City, Pa., fire clay bricks from the West Virginia Fire Brick Co., have been laid in two layers on rammed and rolled gravel and sand, at a cost of \$1.95 per sq. yd., exclusive of grading. The pavement, in use three years, is stated to be very smooth, easily cleaned, and of a handsome appearance.

"Jacksonville, Ill., has laid over three miles of pavement with Virden brick.

Some down for five years is now in good condition. One piece, of one-half mile, two layers, cost, including everything, engineer's services and all, \$1.92 per sq. yd. Sand was filled into the joints in place of pitch.

"Peoria, Ill., paved two blocks in 1886, and five blocks in 1887, with Ottawa paving brick, and Chicago used the same brick three or four years ago on 63d St. car tracks.

"Galesburg, Decatur, Champaign, and Springfield, Ill., have laid more or less brick pavement within five years, the major part of which has given satisfaction. New Orleans and Wheeling, Va., Steubenville, O., Camden, N. J., and other places, have laid experimental sections. The disadvantages of brick pavements arise from lack of uniformity in the material, and the liability of incorporating in the pavement brick of too soft and porous structure, which crumbles the first winter under the action of frost. When laid on a solid foundation, the advantages are, cheapness, smoothness, cleanliness, freedom from noise, and sanitary excellence as non-absorbent. See table above. Taking all things into consideration, it is superior to macadam, wood, and, for a maximum traffic of three tons, superior to granite."

THE FIRST BRICK STREET PAVEMENT IN THE UNITED STATES.

In reply to the foregoing, Mr. J. P. Hale, of Charleston, W. Va., makes the following statements:

Mr. Ryan is certainly mistaken about Bloomington, Ill., being the first city in this country to try the experiment of brick street roadways. The writer laid, in this city, in 1870, what he believes to have been the first block of brick street pavement in America. It was considered by the knowing citizens very absurd and foolish, and predictions were freely made that it would be crushed to pieces within a week, or a month at farthest. Not a member of our City Council was willing to vote a dollar for it, and I put it down at my own expense.

After three years of constant and hard service (it being in the most trying position in the city), with no breaking or crushing, or appreciable wear, the city authorities were so far convinced of its value that they ordered another block put down, and paid for it. This was in 1873, and now, after 16 years constant use, it is in good and sound condition.

In all this time the direct wear and tear of the pavement has cost the city nothing for repairs; the only expense on

it, and that has been but trifling, has been to repair places carelessly relaid after having been dug up or sewers, water mains, gas, etc.

The first experimental block of pavement, above referred to, remained in use and good condition, without repairs, for about 11 years, when the city took it up to cut down and regrade the street, in order to pave it with brick from end to end.

The city has now in use several miles of this pavement, and contracts have just been let for laying about 40,000 sq. yds. more this season. Several other cities have tried it, are satisfied, and are laying more.

A prominent gentleman and large property owner in our city, being written to by a friend in another State, for his estimate of the value of brick pavement, replied: "Our citizens, like all others, differ as to religion, politics, tariff, social questions, etc.; but in the conviction that brick pavements are the best and cheapest in existence, they are a unit."

The system of laying our pavement (which is covered by letters patent) is as follows: Upon the graded surface of the street, spread a layer of sand 3 inches to 4 inches, which is brought to a smooth, uniform surface by a templet drawn over it; upon this place a layer of inch boards which have been steeped in hot gas tar; upon the boards spread another layer of sand about 1½ inches, smoothed by templet, as before; then lay the brick on edge, preferably zig-zag, or, as brick masons call it "herring-bone style," after which put sand over the surface and sweep into the interstices between the brick. There are in use three methods of laying brick pavements,—1st, the method with board floor, just described; 2d, the double course of brick, on flat, and the other on edge, with necessary sand, etc., as laid in Bloomington and other Illinois towns; and 3rd, brick laid on broken stone or concrete foundation, as now done in many cities.

By either method brick makes a cheap and good pavement. The board floor plan is the cheapest and is claimed to be the best, as it gives more uniform and better bearing for the brick, and, consequently, a smoother and more durably even surface to the pavement.

Of course good brick are a *sine quo non* for a good pavement. You can no more have a good pavement from inferior brick than durable clothes from shoddy cloth.

As the selection of material, of manu-

facture and degree of burning necessary for a suitable paving brick are getting to be better understood, adverse prejudice is giving way, and the conviction is rapidly gaining ground in the public mind that good hard brick is the cheapest and best paving material in the world.—*Engineering News.*

Written for the Clay-Worker.

HINTS ON BRICKMAKING.

No. 40.

BY "R. BRICK."

The "settling question" seems to be as far from being settled as ever. There seems to be a difference of opinion as to what causes the settle in a burning kiln—in other words, shrinkage of bricks. Some clays settle an average of one-third of an inch for each brick in height, some one-quarter inch, some one-eighth inch, other clays shrink not at all, and in some places the bricks expand when burned—the latter occurs in burning bricks at Mississippi City, Miss., and at Slidell, La. From this it is evident that no one cause of shrinkage can be applied to all clays, for in some instances we would find the cause without effect. All will agree that it is heat that causes the shrinkage. The intense heat causes the particles of clay to fuse, this action expels the air by closing the pores, the same clay then occupies less space than before. The clays that do not shrink are of such composition that the heat we are able to make in a brick kiln is not sufficient to fuse the particles of clay, hence there is no shrinkage or settle. This is a purely practical view of this question, for when the scientists and chemists disagree, practical men must decide for themselves. When a brick burner finds by experience that his bricks must shrink one-quarter of an inch in burning to give it proper color and strength he should never close his kiln until he has a settle on this basis; if he stops with half that settle his bricks will lack both color and strength. He may have full amount of settle and fail to burn the bricks by settling too soon or too fast and shrinking the arch bricks too much and those above too little. This would not be a true settle, but an arch settle. So you can have the required settle and a poor burn, but never a good burn without the settle required, that is, the amount experience has taught him, makes the best bricks. Then comes the question of how to make a true and uniform settle. The first thing is to get the kiln thoroughly heated in every part before

applying a settling heat, then settle slowly. I think a kiln set 40 to 45 bricks high should have from 60 to 72 hours to settle.

How to heat a kiln uniformly is the next question to determine. It goes without saying that the bricks must be properly set in the kiln, set so that heat can pass freely from the arches. The platting is next the best distributor of heat. There should be a double course of platting, first course of unburned bricks laid crosswise of top edge course, with ends close together and sides one inch apart. The top course should be of burned bricks, smooth and straight, laid as closely as possible. While water-smoking every fifth brick in each alternate row should be set up to make draft and remain up until the brick beneath are dry and hot, then close them down. Should a cold spot appear while water-smoking, shut the platting down over the cold spot and a few feet on either side of it clear across the kiln; in 24 hours it will be warm, then open the platting where it had been cold and it will in a few hours be as hot as the balance of the kiln, (I refer to open-top up-draft kilns). Where the top is kept tight the heat is generated faster than it escapes, and as it accumulates it is forced to every part of the kiln. After the fire is well up and kiln ready to settle, keep the top tight to save heat and distribute it uniformly, from side to side and end to end. Enough heat must now escape, however, to make sufficient draft, for without draft there cannot be proper combustion, or equal distribution of heat from bottom to top. Writers may call it waste of heat, but it is a necessary waste, for a wheel cannot be turned by water power without letting it flow or waste, if we choose to call it waste. Like water we can only utilize it as it passes by, we cannot make it return again so far as the brick kiln is concerned.

AN AUTUMN WAIL.

The season colder grows apace,
The winds begin to roar;
So, when you come into this place,
Please, mister, shut the door.

It's not too warm for flies as yet,
They'd open up every pore;
But frost has come mankind to fret,
So, mister, shut the door.

Don't leave it swinging while we sneeze,
And christen you a bore;
Unless you want to see us freeze,
Why, hang it, shut the door.

Don't make us shiver till we're blue,
And hanker for your gore;

Look here, we've said all we're going to on this subject
and the next thing you know we'll be over
there wiping the floor with you

Unless you shut the door.

—Washington Capital.

Written for the Clay Worker.

HOW TO EMPTY A KILN OF BRICK.

This is an important subject, but one that has been entirely overlooked, at least I do not remember of seeing anything in the Clay-Worker touching upon it. I cannot imagine why all these brick yard writers have evaded this one item in the manufacture of bricks.

The brick itself has a very rough time of it after being dug up in the clay bank and is subjected to a great deal of rough usage until it finally rests quietly in the wall for a time.

The green brick is supposed to be a frail article; liable to become soft from wet or dampness; or if frozen while in a damp state will crumble on thawing. It will also crack in drying or burning, or become broken, shattered or marred in handling at some point between the machine and the finished brick laid in the wall.

On a great many yards, after the bricks are burned, any further care in the handling of them seems to be entirely ignored.

I could cite instances and places, where the bricks are made as good as could be expected with the machine and other appliances.

The pressed brick are all made very carefully and in fact no better made bricks can be found anywhere. But through carelessness or indifference in the matter, all attempts to retain their nice finished appearance, as taken from the kiln, seems to be abandoned. Sometimes there is a rush of orders for pressed brick and in the eagerness to fill orders promptly they are taken out of the kiln while yet warm, and the pressed brick being below part of the common stock, have to be uncovered prematurely and the rough brick are piled back on top of others and are thus in the way of everything below them. These pressed brick after being carefully made and dried, are taken from the hakes and placed one at a time on the brick barrows; each tier on the barrows is carefully brushed with a dust brush; soft blankets are used between tiers, and slats interposed between in the courses; they are set in the kiln one at a time as tenderly as if they were fine ware. But after they are burned—presto: the change is now to see how much they will stand in the way of hard knocks without breaking. They are taken up two or three or more at a time; and if they have been well burned they may be adhering to the faces just enough to cause them to stick together; a blow

with another brick will bring them apart, or make bats of them. They are piled together in heaps, or layers, on tray barrows and wheeled over uneven runways to the cars or wagons; and by the time they are delivered at their destination they are full of scratches and mars, and corners knocked off they look as if they had been left over from the Tower of Babel. That is how not to unload a kiln of bricks. It is a poor advertisement to any company, and a standing disgrace to the man who makes or burns a good article, as his work has gone by default, and the brick ruined in its appearance by careless handling.

All bricks should be handled with care enough to insure good faces on at least one-fifth of all the common stock. The pressed bricks are supposed to each have one face and that should be kept free from all defects, all the time till it is laid in the wall; and even then the mason should use every precaution to keep them from being stained while the building is in progress. On opening a kiln, let the platting be taken up carefully and set back on top of the clamp walls, and all salmon brick or light courses on top be taken down first so as to get at hard brick below. In unloading clamp kilns begin at each end and strip all down to the top of pressed brick courses. Then take out all the pressed brick and do not mix them with common brick, beginning at the front at each end of the kiln, so as to get all clear to that level. Use every precaution to keep the faces of the bricks clean and free of mars of all kinds. A kiln of bricks will unload easier beginning at the end where you left off setting and go back in reverse order, taking out first those set in the kiln last; time can be gained in this way. Try it.

Then when your pressed brick are all out, unload to top of benches, including the overhangers, and let all bats and rubbish fall into the arches out of the way, square up the work on this level to the walls on both sides. Then take out the benches and the rubbish as you come to it, an arch at a time, and your floor is cleared. Much time is gained in this way, your work is orderly, and the brick can be graded as loaded, while in the former case of digging holes to get at the pressed brick much time is lost or wasted, and many bricks are spoiled or broken; and on works where a continuous stream of bricks are expected, it is just as important to unload quickly, as it is to set the brick in the kiln quickly. BRIX.

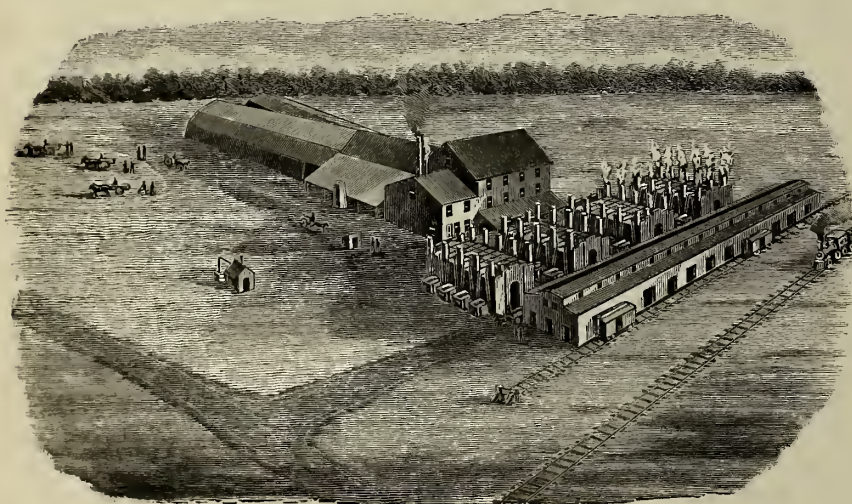
BRICK YARD SKETCHES.

Probably no state in the Union possesses so many advantages for the manufacture of brick as Ohio. Situated near the center of population, midway between the largest cities of the continent, with clays suitable for the manufacture of all grades of fire and building brick abundantly and widely distributed, and an apparently unlimited supply of the best and cheapest fuel—coal, petroleum and natural gas—that state comes as near being the paradise of the brickmaker as the most enthusiastic devotee of the art could hope for.

In consequence this industry is being developed there to an extent of which many of our readers have no adequate idea. Especially is this true of the natural gas region of the state, where brick yards are becoming a prominent

feature, not distinguished, as brick yards generally are, by a volume of black smoke; for, save the steam, the atmosphere is as clear as if there were no fires about the place.

is taken from a large area leaving exposed a level bed of clay. This bed is then cut to the depth of three or four inches and thrown up in a pulverized condition, by a large disc harrow. When sufficiently dry it is put into windrows by a road scraper that it may be taken into the storing sheds by excavating carts and dump carts. A portable railway operated by a hoisting drum run from countershaft, is used to draw the clay in cars from the clay sheds to the machine house where it is dumped into a large hopper, in the bottom of which, or an incline, is a strong spiral conveyor which breaks up the large lumps, if any, and feeds the clay regularly and constantly into a Stedman pulverizer, from which it is elevated about 35 feet and dumped upon an incline screen 16 feet long. The clay that has passed through this



THE CENTRAL PRESSED BRICK CO'S WORKS, NORTH BALTIMORE, OHIO.

feature, not distinguished, as brick yards generally are, by a volume of black smoke; for, save the steam, the atmosphere is as clear as if there were no fires about the place.

One of the best equipped of these plants is situated at North Baltimore, on the B. & O. R. R., about one mile from its junction with the T. C. & S. The works are owned by Cleveland capitalists in the name of the Central Pressed Brick Co., the president of which is P. D. Briggs, of the Standard Oil Co., and the secretary, F. N. Carter, editor of the *Western Machinist*. The construction and starting of the works was superintended by W. D. Richardson, who is still connected with the company.

The process employed is that known as the dry press process and the manipulation, briefly described is as follows:

The soil to the depth of about a foot

screen, of perforated steel, holes three millimeters in diameter, drops into a large hopper from which it feeds automatically into the press below. The press is Simpson's latest improved four-mold machine, which produces a solid brick with perfect edges and a smooth, polished face. From the press the brick, save the ornamentals which go to the dry house, are taken directly to the kiln. The kilns, which are being built as rapidly as possible, are the Eudaly down-draft. The fuel is natural gas from a well about 300 feet from the works. The pressure of the gas is reduced by a high pressure regulator, from about 300 pounds to the square inch to 25 pounds, and thence passes into the low pressure regulator whence it issues for use in kilns and under boiler at a pressure of six to eight ounces.

With no smoke nor ashes, no firemen

to neglect their duty, and a heat that cannot vary except at the will of the man in charge, the burning of brick is a much simpler and surer operation. Verily the natural gas region is a wonderful revelation to an outsider and it is not without some feelings of envy and discontent that he returns home to his wood and coal.

THE WHITTAKER PRESSED BRICK CO., OF
QUINCY, ILL.,

Is located a couple of miles from that thriving little city and is running to its full capacity. We enjoyed a pleasant drive in company with the genial manager, Mr. F. Brown, who, though not professing to know all about brickmaking, is a good, well-tempered business man, and will pilot the concern to success and prosperity, we are sure. The works are located on the Wabash R. R. and are making 15,000 a day by the semi-dry process on a two-mold Whittaker press.

The plant is one of the most compact and conveniently arranged we have seen. The clay is gathered and stored under sheds in the manner common to this process, from which it is wheeled to a platform in barrows and dumped into or near a Stedman pulverizer, which grinds or reduces it very fine. It is then carried by elevator buckets to a chute above the machine, from which it is dropped or fed into the machine. From the machine they go direct to the kilns excepting a few ornamentals which have to be dried some to prevent checking. When taken from the machine the brick are hard and strong enough to be handled easily without danger of marring.

They have four square up-draft kilns with permanent walls, etc., of 200,000 capacity each. They set three on three and five on five or five on two, forty high.

At the time of our visit they were just opening a kiln which seemed all that could be desired. The brick were good and hard up to within the second row below the platting and even that was a good salmon. They use coal, which costs them \$3.25 a ton. Their common brick are now selling for \$6 to \$6.50 delivered.

A large proportion of their brick are excellent face brick and they also make a goodly number of shape and ornamentals.

The new City Hall building now in course of construction is their latest contract and will prove a monument to their credit. The first and second stories were nearly completed. The brick are a rich, dark red and being laid in

white mortar with very thin joints presents a handsome appearance.

AT GALESBURGH, ILL.,

We find the Galesburgh Pressed Brick Co. and the Galesburgh Brick & Terra Cotta Co. both running to their full capacity and entirely on paving brick. They were each making about 30,000 a day on a Frey-Sheckler Acme machine. The clay is taken from the bank hard and dry, much of it seeming to be as firm as stone, and crushed in a dry pan which reduces it to powder. It is then conveyed to a pug mill above the machine in elevator buckets, where sufficient water is added and it passes into the machine. The brick are dried on a hot floor from which they are trucked to the kilns. The latter are Eudaly's patent square down-draft and are spoken of very highly by the superintendent of both yards. The green brick measure $8\frac{3}{4} \times 4\frac{1}{4} \times 2\frac{1}{2}$ and when burned are $7\frac{3}{4} \times 3\frac{3}{4} \times 2\frac{1}{4}$, are very heavy, hard and tough, qualities that combined make an ideal paving material. We examined the pavements laid and found them smooth, firm and free from ruts.

The first block of brick pavement was laid in 1883 and is now apparently as good as when put down. No other pavement is considered there now. They are putting down brick as fast as the city treasury will justify.

The best results have been obtained by first laying a bed of macadam and then a layer of sand on which a course of brick laid on the flat then another layer of sand one inch in depth and then the second course of brick laid on edge, over which a small sifting of sand is swept.

The macadam, while it makes the best foundation, is not considered indispensable, a large portion of their pavement being laid without it. Pavers bring \$9.50 delivered and the pavement costs about \$1.42 a square yard complete including stone curbing.

WELLINGTON, OHIO,

Is a familiar name to very many of our readers for it is here that the Quaker Brick Machines are made and sent out to the craft upon their labor saving mission. At the works of Bennett Bros. & Co. we find the good work going on quietly but industriously. The past season has been a satisfactory one to them. The demand for the "Quaker" continues to increase with each year and now they are actively at work on a new all-iron "Quaker" that will be offered to the trade the coming season and will, they

feel sure, add still greater honor to the name which is already so favorably known to the craft the country over.

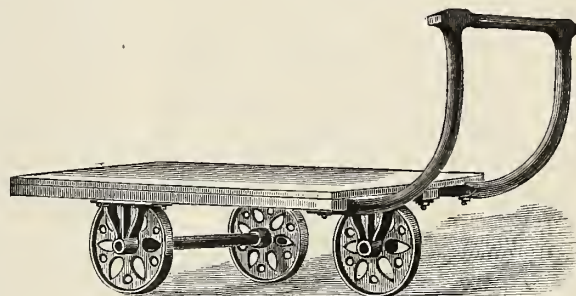
In company with one of the firm we visited the brick and tile yard of Mr. C. V. Hemenway which we found running under the supervision of the proprietor who has had an extended experience. The yard has some original and admirable features.

The brick machine is run by a traction engine; both standing on a track extending across one end of the yard and beside which is a soak pit three hundred feet long, eight feet wide and three feet deep. The clay, which is very stubborn and hard to work, is carted and dumped in this pit and allowed to soak for a day or two when it is shoveled directly into the machine, which, with the engine, is moved back and forward as the pit is emptied. Water is drawn from a large tank erected above the center of the pit.

The water is pumped into it from a well at one end of the pit, by the traction engine, which also furnishes power for the tile mill. From the machine the brick are placed on pallets and trucked to the racks which are among the best we have seen. They are made of $2\frac{1}{2} \times 4\frac{1}{2}$ pieces 6 feet long, set on end, $1\frac{1}{2}$ strips two feet long are set into the upright pieces and on these the pallets are laid lengthwise with the racks, one row on each side of the upright pieces. The pallets hold their shape very well and are easily handled without the least danger of crushing or marring the brick. Mr. Hemenway has used this system for six years and likes it very much. He makes 25,000 brick a day and could make more but the demand doesn't justify it. He has three square open-top kilns with permanent walls, holding 200,000 each, in which he also burns his drain tile. About ten courses of brick are first set in the kiln and then tile are placed on these till the kiln is filled and the tile covered with a platting of salmon brick. Slack coal which costs \$1.05 a ton is used and judging from the tile and brick on the yard the results are quite satisfactory. The tile are made on an Ohio Tile Machine, manufactured by Fate & Freese, of Plymouth, O. In reply to the query "How do you like the 'Ohio' Machine," Mr. Hemenway said: "I have used it for three years without the least trouble. It has cost me nothing, virtu-

ally, for repairs and I want no better tile mill." The tile factory is a one story building 50x150 feet. The floor is raised about three feet from the ground and made of $2\frac{1}{2} \times 2\frac{1}{2}$ strips laid an inch apart. The tile are set two deep and dry rapidly without cracking. They are taken to the kilns on a truck of Mr. Hemenway's own invention and which we illustrate. They are so serviceable that Messrs. Bennett Bros. & Co. have added them to their line of brick and tile supplies.

To Mr. Hemenway belongs the honor of inventing the original horse-power Quaker Brick Machine. The first ma-



chine was made twelve years ago and from it the manufacturers have evolved the improved "Quaker" of to-day.

THE INDIANA TILE AND DRAINAGE ASSOCIATION.

The next annual meeting of the Indiana Tile and Drainage Association will be held in this city commencing the first Tuesday in December next. This is one week earlier than the usual time. The executive committee have thought it wise to make this change for the reason that the annual meeting of the National Brick Manufacturers' Association will occur the week following, and very many wish to attend both meetings. So far as we know the holding of the annual meeting of the Indiana Tile and Drainage Association on the first Tuesday in December will not inconvenience any one, and the change of time will, we think, meet the approval of all.

Further arrangements for the meeting will appear in the following number of this journal. Don't forget the dates, Tuesday, Wednesday, December 3d and 4th. Come yourself and bring a neighbor with you.

There will be peace
Without surcease
For suffering bald heads by and by;
For frost will seize
And quietly freeze
The frisky, festive, fiendish fly.

—Washington Post.

CORRESPONDENCE.

THESE COLUMNS ARE OPEN TO ALL. THE FULL NAME AND ADDRESS IS REQUIRED BUT WILL NOT BE PUBLISHED EXCEPT WHEN PERMISSION IS GIVEN BY CORRESPONDENT. THOSE DESIRING TO COMMUNICATE PRIVATELY WITH ANY CORRESPONDENT WHOSE FULL NAME IS NOT GIVEN CAN DO SO BY ADDRESSING LETTERS CARE OF CLAY-WORKER.

From Our English Correspondent.

Editor Clay-Worker:

As promised in my last letter, I will endeavor to explain from a brickmaker's point of view, why the manufacture of semi-dry pressed bricks is better for his breeches pocket than the plastic, wire-cut or any other description of bricks that require manufacturing in a wet state:

1. Semi-dry pressed bricks can be, and are, made every working day in the year, unless the weather is exceptionally bad. Bricks made plastic, or in a wet state, can only be made during spring, summer and autumn, unless expensive drying sheds are used.

2. Semi-dry pressed bricks can be, and are, made every working day in the year from the raw material taken direct from the bank without any previous preparation whatever, and directly they leave the machinery, are stacked in the kiln ready for steaming and burning, and are not again handled until they are ready to load into railway trucks or carts. Bricks made plastic or wet—the clay should be got in the winter, watered and tempered, and be in heaps until the weather permits it being made up, the money spent in getting and tempering the clay has to lie idle several months after the bricks leave the machinery they have to be hacked under sheds or covers, or dried in a drier. In short, the brickmaker has first to put the water in the clay, make it up into bricks and then dry it out again before the bricks can be stacked in the kiln all of which means dipping his hand into his breeches pocket.

3d. Semi-dry pressed bricks can be manufactured and on railway tracks in 14 days and this enables an order to be executed promptly. Plastic or hand-bricks require about 30 days to manufacture, consequently the money can be turned over twice as often with semi-dry bricks as with plastics.

4. Semi-dry pressed bricks can be, and are, stacked in the kiln directly they leave the machinery and are independent of the weather, neither clay houses for the clay, or driers for the bricks being required. Plastic and hand-made bricks require drying before being set in the kiln, and they are at the mercy of

bad weather if they are dried in a drier or on hot floors. In many cases, the ends come off and the bricks are shaky.

5. Semi-dry pressed bricks.—In the manufacture of these, the brickmaker is in a great measure, independent of skilled labor, the machinery doing most of the skilled work. Any pick and shovel man met in the street can get and load the raw material into trucks or barrows and wheel some dry bricks on crowding barrows into the kiln, the only skilled man wanted is the burner and as the bricks should be set in the kiln to suit him, he is quite able to instruct any intelligent brickyard laborer to set a continuous kiln in a few hours for although the burner's work on a continuous kiln is the most responsible, it is the lightest in the brickyard. Plastic wire-cuts or hand-made bricks require men brought up from their youth in a brickyard and to wheel green bricks directly they leave the cutting table on a cockney barrow is simply a "work of art" and in wheeling and handling the wet clay and wet bricks the water has to be wheeled and handled just as much as the clay.

6. In case of a stagnation in trade and the bricks not selling freely the prime cost of say, two million semi-dry pressed bricks stacked in the yard would be very little more than half of the cost of the same number of plastic wire-cuts, or hand-made bricks.

7. During the winter months, the rent, rates, taxes, clerk's wages and other fixed expenses are going on in plastic and hand-made yards when no bricks are being made, just the same as when the yard is in full work. This is different in a semi-dry pressed yard, as bricks are being made all the year round.

8. In plastic and hand-made yards, during the winter months, the burners and setters have to be paid or work found for them or they would leave, whereas these men are employed in semi-dry yards all the year round and are contented.

9. In a semi-dry pressed yard the the spring demand for bricks (when good prices are realized) can always be supplied, whereas in a plastic or hand-made yard, the bricks are generally gone before the spring arrives and there are no bricks to sell until they are made.

10. In a semi-dry yard, but little stock need be kept as the bricks are made the winter through but in a plastic or hand-yard, the bricks must be stored up in summer to supply the winter demands.

The machinery first used for manufacturing the Petersboro semi-dry pressed bricks came from various English makers and required presses independent of the perforated pan and machines, also the cylinders and presses lubricating with creosote oil, but about two years since, a Petersboro brickmaker who had hitherto made nothing but plastic wire-cuts, to save his yard being shut up by the semi-dry brickmakers, introduced in this district two new machines to make semi-dry bricks, viz., the same machine as advertised in the Clay-Worker by McCoy, Ives & Co., Quincy, Ills., with that excessive modesty for which *all* Americans are so justly celebrated, as "THE BEST ON EARTH," "Whittaker's Celebrated Semi-dry Brick Machine."

Well, Mr. Editor, I won't find fault with their advertisement, for there is good foundation for what they say, but their ——— is certainly worthy of admiration. Whittaker's Machine had been in work but little time before we all saw the machinery previously in use must take a back seat and at the present moment one of the best Petersboro pressed brickyards are taking out their semi-dry machinery and substituting two of Whittaker's, and so far as appearances go, this must be done (sooner or later) in the other yards. The reasons are, first, Whittaker's does away with two boys lifting brick from machines to presses, the youth feeding hopper above machine with ground knots, also the brick (creosote) oil for cylinders and presses, Whittaker's being lubricated with steam from the boiler, and in addition to this, turned out bricks with square corners, good edges, good shape, hard, sound and second to none.

Now, Mr. Editor, I do not wish to persuade every brickmaker that he can make semi-dry pressed bricks, because it would simply be an impossibility. The first absolute necessity is that he should have a clay or shale that will grind through a perforated bottom pan. I am no advocate for disintegrators for semi-dry brickmaking. In my opinion, this is the rock that has tripped up many a semi-dry brick maker. The disintegrator provides a crushing vertical motion. A perforated bottom pan gives a grinding, horizontal motion, grinding the clay or shale into small pieces that would pass through a riddle $\frac{1}{8}$ to $\frac{1}{4}$ of an inch mesh and this is necessary for the semi-dry press. I have seen disintegrators choked with semi-dry clay or shale, which ground

easily in a perforated bottom pan.

Some time ago, a brick manufacturer who had been accustomed to our Peterboro semi-dry brickmaking, opened a large brickyard where there was a deep bed of gault of superior quality suitable for making plastic, wire cut, cream colored bricks. After he had got his yard into work in an evil moment he thought he could make this gault into semi-dry bricks by the same process in use near Peterboro. He obtained the same machinery and presses used here and made a start. After he was totally unable to get the gault through the pan bottom, the idea occurred to him to build an enormous steam drier, using the waste steam from his 80 h.p. horizontal engine and on this floor dry the gault before putting it in the perforated bottom pan. He partially succeeded, but the cost of dumping the clay on the floor, picking it up again and other contingent expenses, made the cost of the finished brick more than he could make them plastic. Afterwards, he purchased a disintegrator, and he found the gault went through fairly well but as for getting it through the semi-dry machinery afterwards it was out of the question and the last time I was in the yard the semi-dry machinery after being altered time after time trying to work the gault, was pulled out and sold for little more than old iron.

As I have endeavored to explain my views as to the expedience of brickmakers manufacturing semi-dry bricks *when they have suitable clay or shale*, I will in future numbers of the Clay-Worker, (with your permission) publish a complete set of detail drawings of the continuous kiln in use here burning the semi-dry bricks so that any brick manufacturer can build one without further instructions, and also give full detailed particulars how to burn the bricks in same so that any intelligent brick burner can take charge of one of these kilns.

R. S. BLUCK.

Petersboro, Eng.

How Can We Get the Right Color.

Editor Clay-Worker:

I would like some practical red brick burner to give me advice through your paper. The clay on this yard is a blue, river clay; it is mixed with about one-third fine sand and works well with a machine. The brick do not shrink much; I set them 40 high and burn with coal. The bottom of the arch is three brick wide. I make the straight

courses 8 high and close with 5 brick. Each third course is tight; the first overhanger we make tight and the fourth and second, third and fifth, we make as loose as they will bear. The sixth brick, or the binder, is set straight on top of the overhangers. The two bottom courses of the middle brick are set loose, and 6 packed tight. The skentling I put in as loose as it will stand, so the fire can get out of the arches. On top of the arch we set the brick 3 on 3 and put fine coal in about three times—the first about 10 courses above the arch, then 7 courses higher, and then on top. We put on raw plating about two inches apart; as the fire comes up put on burnt plating. When we set fire we dare not get it through in less than thirty hours; if we do, —the heads of all the brick in the arch fall off. We can get the kiln hard up to the second standing course. All the brick fourteen courses above the arch are beautiful red and the rest are pale red. We did try to give more fire but then we spoiled the arch.

How can we get the desired color? Please give me advice through the Clay-Worker.

A. J. KAUTZ, JR.

Newport, Pa.

Adobe Houses in Louisiana.

Editor Clay-Worker:

No doubt many of your readers would like to read something of how the early French and Spanish constructed their residences in the long past. I send you a clipping from the *Sugar-Bowl* written by Col. F. D. Richardson. You will find the article interesting. The Colonel is an old settler on the Teche (pronounced Tash.) Since coming to this land I have visited and examined many of these unique adobe houses, some of them fifty or more years old and to all appearance as good and sound to-day as when first constructed. To the visitor these adobe buildings present a strange and striking appearance not soon forgotten. To this day in some of the southwest parishes, now and then, an adobe house is built. They are comfortable and pleasant to dwell in. You can not tell a man in this country every time by the house he lives in. Many of these people are worth thousands of dollars, have plenty and are well to do. But gradually wood and brick is taking the place of the ancient moss adobe structures. St. Martinsville, that Col. Richardson mentions is to-day a fine, gay

old town on the loved Teche—the P'Tre Paris, of Louisiana.

W.

Haasville, La.

OLD MEMORIES.

Almost the universal style of buildings everywhere here were adobe, not of unburned brick, as is often supposed, but a mixture of clay and moss. This, to all prairie countries, was what the historic loghouse was to all woodlands of the United States, an architectural necessity. They were erected very much on the house raising plan, so familiar to our fathers, by joint labor. When a church like the first one at St. Martinsville, had to be built, it was made the great event of all the country round about, and was, no doubt, attended with all due rites and ceremonies. But in the construction of the ordinary family residence of two rooms, with chimney of the same material in the middle, it was about as follows, as we have often seen it done: Friends and neighbors were invited in sufficient number with ample refreshments made and provided. A place was selected convenient to the building with loamy soil suitable for brick, and a hole was dug of sufficient size for the quantity of material required. This, after deep spading was watered to the consistency of brick mortar. Then green moss, of which a sufficient pile had been provided, forehand was spread like a gray blanket over the mortar bed when a certain number of men, barefooted, with trousers rolled up above their knees, tramped the circle, crushing in the moss to the bottom of the loose earth. Then came another layer of moss and another tramping and so repeated till the pit was full to the top of adobe—moss and clay. This material was then pulled out by blankets or sections as it was tramped in and taken to the building already completed except the walls or weather boarding for which this mixture was the substitute. In sections of country where there was no Spanish moss, prairie grass or hay was used as a poor substitute. Beginning at the sill they went up, firmly, driving sticks nearly horizontal between the studding about every six inches, to hold the mortar to its place, and when finished, these sticks were in the center of the wall. This, when half dry, was shaved off with a sharp spade and left to dry and when well white washed made a solid and pretty wall, cool in summer and warm in winter. This was one of their orders of architecture, but there was still a "lower deep" in which there was no floor or sills, the

ground mortised and round holes used for studding with the adobe applied in the same way. For flooring, they had good, well pulverized clay with a top dressing of ashes, well beaten in, which two or three Cajan balls would make as hard and smooth as a sanded floor. Split boards or thatch was often used for covering and gables, all attesting human ingenuity before the time of saw mills and such business.

Their modes of conveyance were about as primitive as their style of building. The family cart, *celeche*, (pronounced callash) was a vehicle made entirely of wood and rawhide, which supported the body box over the axle-tree. In fancy, we could see the sad, anxious face of Evangeline, peering out in every direction for her lost and loved Gabirel. A very serious accident happened to one of these vehicles at a tavern near us in the 30's. An old couple from *Pare Perdu* put up for the night on their way down the *Teche* and their *celeche* and gear was left in the yard. Next morning the box was on the ground—hungry dogs had devoured all the springs and the traces.

Progressive Brickmaking in New England.

Editor Clay-Worker:

To any one accustomed to the old, cumbersome method of manufacture prevailing among the New England brickmakers, for there has been no important improvements either in the process or the product for many years, a visit to the works of the Barrington Brick Company at Barrington Center, R. I., will be an agreeable surprise.

Six months ago the site of the works an unsightly swamp covered with scraggy trees and underbrush and the idea of a successful business ever being established there was considered absurd, but as subsequent events have proved, the promoters of this enterprise knew their business.

Mr. W. K. Logee, the principal in this new company was too shrewd a business man to go into so large an enterprise blindly. It was not until he was satisfied from carefully conducted experiments that he put his plans into shape and formed the present company.

Mr. Logee secured the services of Mr. Alfred Morgan, a gentleman of large experience in brickmaking both in this country and in England his native land, to whom was entrusted wholly the erection and equipment of this splendid

plant and the result proves that the trust was not misplaced.

The clay is taken direct from the pit in a car with a capacity of ten to twelve barrow loads and drawn by cable driven from the line shaft up an inclined track to an upper floor in the main building where it is dumped into an open mixer, of a new design; when it is properly tempered and from which it passes by gravity into the brickmaking machine upon the ground floor without elevators or travelers (commonly used in other yards) or manual labor.

The machinery throughout is certainly of novel construction and performs its work marvelously. It must be seen to be appreciated. It was constructed by Messrs. Frey-Sheckler Co., of Bucyrus, Ohio, from designs furnished by the Superintendent, Mr. Morgan.

The brickmaking part is an improvement upon the Acme Machine made by this company. The idea was to have a machine of double the capacity of the above and this machine which is called a duplex Acme for that purpose according to specification furnished by the Superintendent. It is in some respects similar to the old Acme but that it has a double delivery upon one shaft with triple gearing driven by a 12-inch belt. In conjunction therewith is a double steampower press also the design of this same superintendent. It is (as we were informed), the outcome of many years of careful study and practical familiarity with other presses in use for the same purpose. It is indeed, a splendid machine; it is admired by every practical man who has seen it and watched its operation. Its chief characteristics are strength and simplicity, always the most desirable features about brick machinery. The brick are taken from the D Acme and passed through this press and then placed upon cars holding 500 bricks each car and then carried into tunnel dryer heated by steam which are giving good satisfaction. They are then passed on to the kilns.

At present they are burning in the old way. The first kiln was burnt while we were there and for color and soundness, the bricks were far superior to any we had seen in New England, fully equal to the Philadelphia pressed bricks, and this is the more remarkable from the fact that this result obtained from the clay in its natural state. They are enabled to obtain any grade of color from a deep cherry red to a dark brown, leading one to suppose that there were some additions in coloring matter used, but Mr.

Morgan assured us that such was not the case. The impressions with regard to these are strengthened when compared with the product of an adjoining yard which has been in operation thirty years or more, manufacturing from precisely the same clay but in the old way. They have not the same color and the brick itself is far inferior in quality. One is inclined to the opinion that there may be some peculiar or secret method of burning which the superintendent and his men are not disposed to reveal.

They are making preparations to erect a series of permanent kilns upon the semi-continuous principle and from the plans shown us by the superintendent they will no doubt be of very great advantage, and place them in every respect independent of wind and weather. They purpose running the works the year round which will be another great advantage to the concern by enabling them to secure a better class of help and better prices for early spring contracts, and to the town as well, inasmuch as it will induce permanent residents; a different policy having been pursued by the adjoining establishment which has imported its help every year from Canada, an element of no benefit to the township either morally or financially. This new departure of this Barrington Company if continued, must further conduce to the profits of the stockholders having a superior class of workmen as indicated already in the superior quality of the bricks must command higher prices and the range is so great that any demand may be supplied.

A superior quality of vitrified brick can be made from this clay, a sample of which was shown us which goes to show the impression false which obtains among western men, viz., that good vitrified bricks cannot be made in New England.

One of the pleasing features about this place was the seeming intelligence characterizing the actions of the majority of the men. Every man appears to have his place and to fill it. There was none of that hustling and driving which invariably takes the place of work. Everything seemed to be automatic from the first shovelfull of clay to the loading of the bricks upon the railroad cars ready for shipment. Although the employees were of several different nationalities, perfect harmony prevails.

Loafers, drunkards or vicious men are not tolerated as Mr. Morgan has no use for such people. He is, himself, an Eng-

lishman by birth, but an enthusiastic American by naturalization and inclination and appears very proud of his adopted country.

The success of the Company has been phenomenal but not undeserved for they have invested their capital in one of the best plants in the United States, with a capacity of sixty to seventy thousand bricks per day with contracts away up in the millions and such is the demand that they are already planning to duplicate their present plant.

Warren, R. I.

A. E. COVEL.

Paving Brick.

Editor Clay-Worker:

No doubt a very large number of your readers are now, more or less, interested in the subject of street paving brick. I think I have written something on this subject before for your columns, and I have recently seen from the pen of others some very valuable suggestions on the subject of street paving brick.

If you will allow me, however, I desire to state briefly some of the things I have found to be necessary for the production of first-class street paving brick. Of course the first thing to be mentioned, is the kind of clay to be used. There is a general impression among city councilmen and city engineers, and in fact among a large number of the manufacturers, that in order to produce a first-class paving brick you must have fire clay, this is a mistaken idea. Every one well knows that the better the grade of fire brick the less the bond when burned; and every one well knows that the better the paving brick the greater the bond when burned.

Again, for a superior paving brick you must have a clay that will stand a very high heat for a long time without melting; from this fact I think has grown the impression that paving brick must necessarily be made from fire clay. And for the same reason many persons who have clays that make excellent street paving brick, because of their standing a very high degree of heat in burning, imagine they have fire clay.

It is not an unusual thing for me to receive specimens of such clays, to be tested or examined for their fire clay qualities, when in fact they do not resemble a fire clay in scarcely any particular. It is not my purpose in this article to give an analysis of the various kinds of clays, or to show the chemical constituents of fire clay, paving brick clay, etc., but I desire simply to make a

few plain, practical suggestions in reference to the paving brick clays as compared with other clays, as well as some of the practical ways of testing them. With the novice in the business he may have some idea of what kind of clay he has as he takes it from the bank, but he should, at least, be placed in possession of the practical ways of testing it, in some more definite manner than merely a casual examination. Of course the most thorough test that can be given any clay for paving brick purposes, or for any other kind of ware, is to burn it. This suggestion is not new by any manner of means, and has been followed repeatedly, with very satisfactory results, yet in many instances, it has proven very unsatisfactory. To illustrate: Many persons imagine they have a fine bed of clay for street paving brick, sewer pipe, etc., and having heard that to burn clay is the most practical way of testing its qualities, they procure a small portion from the bank, more than likely in a dry state, and place it in a grate fire of wood or coal; or, as is more often done, go to the nearest blacksmith's forge, and there make, what is thought to be, a thorough test, by heating the clay suddenly to a temperature great enough to melt cast iron, in fact I have often known of the iron being placed in the forge with the clay for the purpose of making the test.

It does seem to me, that any one, on second thought, would readily realize that this is practically no test at all, for the reason that there are always particles of iron in the forge which unite with the clay, and if the clay itself does not contain sufficient iron to make it thoroughly vitrified it would take up enough in the forge to give it this quality. The same is also true in testing clays in coal stoves, or grates. Often the clay is suddenly heated to a degree sufficient to destroy all its plastic qualities in one part before the water that is mechanically united with it, is driven off from other parts.

I have had pieces of clay sent to me that had been burned in this way, which when broken, showed all shades of color, from black or dark gray to a bright red. Clays to be tested well, must be *gradually* brought to that degree of heat necessary to burn the ware, as the term is understood by the brickmaker.

Many others desiring to make a more thorough test, carefully pack a few pounds of clay and send it to some brick manufacturer who very kindly makes two or three bricks, as the case

may be, by carefully pulverizing and pressing, and perhaps repressing, after he has formed the brick to suit his fancy, it is set away in some dry place, where it remains for days, or perhaps weeks, until he has a kiln set and almost ready to fire, then these bricks now thoroughly dried, are placed in the kiln for burning; now all the brick in the kiln are seldom, if ever, as thoroughly dried or as well made, as the ones set in to be tested.

Again the clay in the brick to be tested is not, in all probability, anything like the clay from which the main kiln is made, consequently, you have in the same kiln to be burned a large body of brick made from one kind of clay, a part of which may be well dried, or more than likely a large per cent. of them are not thoroughly dried, and in the same kiln you have a small number of brick, made from an entirely different kind of clay, thoroughly dried. Now in water-smoking the kiln, the water driven out of the kiln proper will necessarily penetrate the brick that are set in to be tested, and will produce in them the same degree of moisture as the other brick, this very often cracks the brick to be tested, or produces what is known as watersmoke or whitening of the surface, however, this is not the most serious objection to testing brick in this way.

The few brick that you have placed in the kiln to be burned being thoroughly dry and made from a different clay from that in the body of the kiln will not burn the same with the same temperature and time, and the brickmaker cannot, of course, hazard the entire kiln of brick in order to get out a few samples, consequently he burns the kiln with reference, not to the samples, but to the kiln. If the samples come out good then the clay is said to be good, if they come out poor you will have as much doubt as to the quality of your clay as if you had not made the test at all.

I once knew a terra cotta maker who desired to test some terra cotta clays which he thought would burn a very clear white and which he afterwards found to be the case, but in his tests he placed the samples made from this clay in the same kiln with ware made from red clays, and to his surprise upon opening the kiln he found his samples made from white clay to have a strong pinkish tinge, which was caused from the iron in the red clays being taken up by the white clay in burning. While I have mentioned some of the difficulties and dangers liable to arise in testing clays in

this way, I do not wish to be understood as condemning the system for it is often the only available method the brick-maker has. I simply desire to guard against some of the errors that might arise.

I have found that the clays that give the most satisfactory paving brick have very little sand, or surface clay in them.

They are generally found deep in the ground and are known as shale or soap-stone clays. I have seen, however, some very excellent paving brick clays found in a plastic form in the bank.

The tempering of clays, is perhaps, one of the most important things to be considered in connection with manufacturing good, first-class, paving brick. Clays that make good paving brick are usually very hard to grind and temper.

If the clay is of a plastic nature it is generally tough and waxy in appearance and feeling, and will not easily take water in tempering, and if ground before drying, usually passes through the crusher, or rollers, in flakes; which are not easily broken in the pug mill or machine, and are often found in the brick untempered.

If the clay is in the form of a soap-stone or shale, they must necessarily be passed through dry pans or other heavy crushers, and thoroughly pulverized before tempering in the pug mill or machine.

I have often heard it stated that clays could be tempered too much, this I believe to be true of many clays used for making common brick; but I have yet to see a clay suitable for making paving brick that could be tempered too much.

When the clay is well tempered the particles unite more closely, the brick is less porous, and consequently when burned is much stronger, and the brick when broken presents a smooth glossy fracture.

The shape and size of paving brick are also very important things to be considered. For building brick, sewer work, etc., it is desirable to have a brick with good sharp corners, but for street paving brick the corners should be round.

The brick is much stronger and will stand wear in the street much better, for the reason that the sharp corners are easily broken off, and of course do not break from each brick exactly in the same proportion and therefore the street will soon present an uneven and rough appearance. As to size, I think many city engineers are making a great mistake by requiring the brick to be made extra large. Some even go so far as to advocate large square blocks. This kind

of a brick is hard to manufacture, hard to dry and very difficult to burn. They will not dry or burn evenly and therefore do not make a proportionately strong brick.

Again I have found many manufacturers making the brick in width and thickness the usual size of a common brick, but at least one-third longer, this I think to be the greatest error that I have observed in the size of brick. It is difficult to bed a brick in sand or on concrete, so as to prevent its breaking when the length is out of proportion to the width and thickness. I believe that the best size brick for street paving is about $2\frac{1}{2} \times 4\frac{1}{4} \times 8\frac{1}{2}$ inches.

For the manufacturer this is undoubtedly the best brick to make for the reason that he always has a brick salable as a common building brick. In building plants for manufacturing paving brick, or indeed for the manufacture of any kind of clay wares, I think they should be constructed with a view of running the entire year.

The reason is apparent to the manufacturer. The money invested in building the plant, would, if loaned, bring an interest for every month in the year, and should, when invested in the manufacture of brick, do the same, besides a plant run the greater portion of the year is generally kept in a much better condition, and the manufacturer is much more likely to have a good stock of brick on hand early in the season when brick bring better prices than later in the season, this, however, applies more particularly to the manufacturer of common brick.

Before closing this article allow me to mention briefly some of the streets of Cincinnati, made with granite blocks. I find in several parts of Fourth Street, that the granite pavement is now being torn up, and that new blocks are being put down in place of the old ones. The old blocks do not seem to be worn out, in fact, they seem, to a casual observer, to be in a fair condition, but on investigating the matter carefully, I learned that the street had become very dangerous, for the reason that the corners of the granite blocks have worn off leaving the top of the block very oval and smooth, and it was said that horses passing over the street, were constantly falling.

The old blocks are being replaced with new ones of much softer granite. When the street was first laid, any block that had indications of being soft, was rejected; now the blocks that have indications of

being hard are rejected; the reasons given are that the soft blocks wear down more uniformly, and do not have a rough surface; further, that the horses' hoofs adhere better to the soft blocks than they do to the harder ones. This I find to be one of the best arguments in favor of brick for street paving, that I have ever heard. I feel confident, that if the contractors and manufacturers of street paving brick will see to it that nothing but the very best brick, made properly from the best of clays, and well burned, are used in the streets, that it will not be long, until brick will come into general use. In fact many cities are now preferring them to either granite, asphalt or the cedar blocks. W. A. EUDALY.

Cincinnati, O.

Machine vs. Hand Yards.

Editor Clay-Worker:

If you will grant us a small space in your columns we will endeavor to reply to the Village Brickmaker's communication in the September Clay-Worker.

I am a very poor writer but will try to answer a few of his questions. The reason why "Mr. V." perhaps sells so cheap is that he is about "busted" and must do the best he can or perhaps he wanted to get money to buy a machine. Hand yards out here are getting few and scattering for the hand-made brick can never come up to the stiff mud wire cut machine brick. That we know by experience for we run a hand yard for years and when we shipped the brick 20 or 30 miles from home they were all broken, but now we ship brick 300 or 400 miles, with but little breakage. If we had hung on to the old hand method, under the shadow of the machine yards about us, and that is why I intimated that may be "Mr. V." was "busted." However, I am not slurring "Mr. V." at all, he may be able to buy ten yards like ours, but I am sorry he is so far behind the times. Ten or fifteen years ago the man that had a brick machine was odd but now the man that makes brick by hand is way behind the times. Another thing, Mr. Village Brickmaker, if we at our works didn't make over \$2.38 per thousand profit on our brick we would sell out. Look here, we make about a million brick in the season which would be \$2,380 at the profit named. Now if that is too much for one year after living out of it and wear and tear of machinery we would like to know. You ask, "Are we here to stay?" We answer no. We venture to say that in ten years from now the hand

yards will be as scarce as hen's teeth. We have the grit to tell just what profits we make and would have answered it long since had we noticed it before. We sell brick for \$5.25 and our profit is \$2.97 per thousand. We agree with you inasmuch as you say all men are not qualified to run machinery and we are afraid the Village Brickmaker is one of that kind inasmuch as he has seen machines in operation so long and hasn't yet seen any good in them. Well, Mr. Village Brickmaker, you can believe as you please and we "City Brickmakers" can believe as we please. We hope you will not be offended for we are only giving you a little of our experience. A. SKIMMER.
Washington, Iowa.

A Skeptic Brickmaker.

Editor Clay-Worker:

I am comparatively young in the brick business but I have tried for nearly twenty years to be an earnest seeker after knowledge in connection with the manipulation and burning of clay. I have read carefully everything that has come in my way on these subjects. I have made my full share of mistakes, and until I saw the last number of the Clay-Worker was unaware why I had so signally failed. With J. W. Crary, Sen.'s record of more than thirty years before me, and his conclusions so sure and certain, I am now satisfied that I lack either the intelligence, the inventive genius or the patient industry and perseverance so requisite to success. It is possible that more than one of these elements has failed to put in an appearance in my experience. Another reason may be that I have lacked that power of discrimination amounting almost to intuition that would enable me to secure the services of the *very best* and *most* skillful and practical brickmaker. It is just such a man as J. W. C., Sen., describes himself to be that I have been looking for.

Seriously, my dear editor, I question very much the propriety of holding out such glowing inducements to capital to embark in our trade. I question the wisdom of such advice as J. W. C., Sen., gives so freely.

He says he cannot tell any man just how he can burn perfectly a kiln of brick. Can he any more easily tell how to select the man who *can* burn brick perfectly? It seems to me a little unfair to expect every brickmaker to be as fortunate as the three firms who secured *his* services. In the evolution of brickmakers J. W. C.,

Sen., may be reproduced and possibly improved upon.

I am hopeful, for Emerson says: "We are all wise in capacity though so few in energy, there needs but one wise man in a company and all are wise, so rapid is the contagion * * * Yet within the limit of human education and agency we may say great men exist that there may be greater men."

JAMES JOHNSON.

Lacks Faith.

Editor Clay-Worker:

It is an easy matter to set down in an office and draft the plan for a kiln that will require so many brick or tile to fill, and so many atoms of heat to burn the ware, and write out the rules by which any greeny can make as good a burn as the experienced burner if he only follows the rules laid down. To illustrate our idea, we may say, it is like a gun, it takes so much powder and a certain pitch to hit the target. When this is determined the bull's eye can be hit every time.

That is, we can always have the same kind of a burn, same color, same hardness, and no loss. That such a kiln will be in operation soon on a large scale, etc. And when we have made all the nice points in our ideal kiln the bones of some old brickmaker turn over in the grave to say, "That's an old chestnut." And some live practical brickmaker is so unmindful of our feelings as to say: "You are a — fool."

So it is, men are not appreciate in their day and generation because they are hindered some way in realizing their fanciful ideals.

When we reach the point that we can watersmoke in exactly a given time, raise the heat to different degrees of temperature in exactly so many minutes with a given amount of fuel and then complete the burn by rule, and have the same result in a hundred, yes, a thousand times, regardless of wind, weather or other contingencies that we cannot control, then will be ushered in the clay workers' millenium. Yea, verily.

PETER SIMPLE.

A Paving Brick Plant.

Editor Clay-Worker:

We are so well pleased with the Clay-Worker that it affords us pleasure to enclose herewith our subscription.

We have been engaged here in the manufacture of the ordinary building brick for a number of years and have

lately taken a large contract for making paving brick for the city. We have bought of J. W. Penfield & Son, Willoughby, Ohio, their largest No. 10 D Brick Machine, Crusher, Pug Mill and plant complete. When in full operation, will have a capacity of 50,000 per day. We saw their advertisement in the Clay-Worker, wrote to them along with others for catalogue and prices, telling them we had taken a large contract and wanted to purchase machinery and a complete plant. We do not believe that we will have any occasion to regret buying it. We have an Atlas Engine made at Indianapolis, Ind, 90 h.p., and have an inexhaustible supply of the finest of shale, which, according to the report of our State Geologist, J. C. Branner, is equal to that of Akron, Ohio, which is considered the finest body of clay in the United States.

The following comparative statements may interest some of your readers. No. 1 is our clay.

No. 1.	No. 2.
Bocquin & Reutzel.	Analysis of the shale at Akron, Ohio, for the manufacture of sewer pipe.
Analysis of the clay shale exposed by the road leading south from Fort Smith, and just south of the rifle pits on "Nigger Hill."	
Per Cent.	Per Cent.
Silica 53.43	Silica 60.05
Alumina 22.50	Alumina 20.00
Oxide of iron 8.36	Oxide of Iron 6.82
Lime 0.32	Lime 0.52
Magnesia 1.14	Magnesia 0.45
Potash 2.18	Potash 1.79
Soda 1.03	Soda 1.60
Sulphur 0.16	Sulphur 1.95
Loss on ignition 6.87	Loss on ignition 7.93
100.99	101.11

No. 3.	No. 4.
Analysis of the gray clays overlaying the sandstone of Harding & Boucher's quarry, about a mile and a half south of Fort Smith. This clay is produced by the decomposition of clay shales similar to No. 1 mentioned above.	Analysis of the upper mottled portion of the clay overlaying the sandstones of Harding & Boucher's quarry south of Fort Smith.
Per Cent.	Per Cent.
Silica 57.10	Silica 65.12
Alumina 23.74	Alumina 19.05
Oxide of iron 8.18	Oxide of iron 7.66
Lime 0.53	Lime 0.34
Magnesia 1.04	Magnesia 0.31
Potash 1.53	Potash 1.23
Soda 0.87	Soda 0.85
Loss on ignition 7.21	Loss on ignition 6.12
100.20	100.63

We now have one contract for street paving that will require two and a half million brick. BOCCQUIN & REUTZEL.

Fort Smith, Ark.

The landlord of a hotel at a fashionable summer resort asked a witty guest who was about to leave if he would not write some sentiment below his autograph on the hotel register. The wit immediately wrote "I came here for rest and change. The waiter has the change and the landlord has the rest."

JONATHAN CREAGER'S SONS,

MANUFACTURERS OF

The Latest Improved Brick Machinery, Cincinnati, O.

The "Grand Automatic" is the only machine on earth having an Automatic Pitman that affords absolute relief and regular pressure. Our complete plants of brickmaking machinery are combinations of practical improvements and labor-saving devices. If you are making brick to make money, we solicit your attention. If you wish to make all perfect brick and make them cheap, our machine is the one you want. Do not allow yourselves to be taken in by machines that are claimed to be "equally as good as our Automatic", for they are not. Experience is a good teacher, but rather expensive. Correspondence solicited.

—:O:—
Testimonials.

(Copy.)

TENNESSEE PAVING BRICK CO.,
Manufacturers of
Granite Street Paving Brick.

Robbins, Tenn., Sept. 14, 1889.

Jonathan Creager's Sons, Cincinnati, Ohio.

DEAR SIRS—Enclosed please find order for your "Special Grand Automatic", Steampower Brick Machine, with automatic pitman, iron rails and table, arranged to make brick from 2½ to 6 inches thick and 12 moulds to accompany same. The sizes of moulds are as follows: 9 3-16x4 11-16x2 11-16. We wish to have these moulds made so that we can have plates put in the bottom with word "GRANITE," and would like you to do it for us. Please let us hear from you and oblige Yours Truly,

W. M. TASLEY, Sec. and Treas.

(Copy.)

Office of

FORT PAYNE COAL AND IRON CO.,

Fort Payne, Ala., Sept. 23, 1889.

Messrs. J. Creager's Sons,

GENTLEMEN—Enclosed please find requisition for machinery and tools for our

Fire Brick Works which, we trust, you will be able to deliver to us at Fort Payne within the time mentioned.

Respectfully Yours,

Fort Payne Coal and Iron Co.

Per W. Keith.

Office of

BALTIMORE BRICK COMPANY,

1142 Main Street,

Richmond, Va., Aug. 28, 1889.

*Messrs. T. B. Townsend & Co.,**Zanesville, Ohio.*

GENTLEMEN—We have contemplated for some time purchasing a brick machine and upon an examination of most of the catalogues, were very favorably impressed with the Grand Automatic, manufactured at Cincinnati, O., by Messrs. Jonathan Creager's Sons, and when we noticed your testimonial of April 6th, 1887, stating you were well satisfied with the machine you purchased from them, we thought more of it, and concluded to write and trouble you to tell us in plain terms what you think about the Grand Automatic. A word of commendation from a Company which enjoys the enviable reputation enjoyed by your concern throughout the country, would have more influence upon us than what a dozen manufacturers would say in praise of their productions. If this is not asking too much of you, please answer at your convenience. Yours, Etc.,

FORBES & MANN.

Per Mason.

Office of

T. B. TOWNSEND & Co.,

Manufacturers of

Red Pressed, Ornamental, Enamelled and
Common Brick,

Zanesville, Ohio, August 30, 1889.

Messrs. Forbes & Mann, Richmond, Va.

GENTLEMEN—Your letter of recent date to hand and replying will state, we have two of "the Grand Automatic's" in operation with a daily capacity of 25,000 brick each and if we could manage to take the brick away from the machines, we could just as easily make 30,000 to

35,000 per day. We make six brick at a time and we use both steel and wood pallets. We have one of their first machines in use, but it is not nearly so good as the latest improved machine, although it makes brick the same, yet they have strengthened the weakened parts and parts that were apt to give way so they are now safe machines. We have tested a number of machines, having them all put in on our yards on trial, which was the only way we would take them and until we got the "Automatic" we were never satisfied. Now we are not in the habit of giving testimonials, and do not think it is the best policy always, but if you are going to purchase a machine, we do not know what to advise you to get outside of one of Creager's machines. The price is not exorbitant and the power to run one does not exceed six horsepower, probably twelve horsepower including pug mill, which you would want to go with the machine. For the quantity and quality of brick it turns out, we think it requires less power to run it than any other. Whenever we run our machine at a capacity of 28,000 per day, we are making them for just one-half what it costs to make them by hand, so you can see there certainly is a saving in using their machine. Then the brick made by hand are not to be compared to those made on the machine, as the machine brick are more compact and straighter. If we were going to give you advice, we would say: Buy the "Grand Automatic" Machine.

Yours Truly,

T. B. TOWNSEND & Co.

We have received (October 8th), an order from the Baltimore Brick Co. for a plant consisting of Brick Machine, Pug Mill, etc., and we will certainly show the City of Richmond some brick to be proud of.

For catalogue, prices and any further information, address

JONATHAN CREAGER'S SONS,

127 West Second Street,

CINCINNATI, OHIO.

OUT OF THE ASHES.

Edgar M. Heafer, Bloomington, Ill., has just completed his new tile works upon the same site occupied by the old works which were destroyed by fire a few months ago. The new brick building is 80x175 feet, two stories in height, with basement system of steam pipes for drying, requiring about 14,000 feet of iron pipes. Every convenience has been provided that the proprietor judged to be of real advantage to the business. There are two Brewer mills in position. The power provided to run the machinery and heat the works is a 75 horse-power engine and boilers, using dead steam by day and live steam at night. They have also recently built four common down-draft kilns 20 feet in diameter inside. Mr. Heafer says: "After years of experience in the use of different kinds of kilns, some of our own invention included, I like the old down draft kiln best."

OFFICIAL ANNOUNCEMENT.

Fourth Annual Convention of the National Brick Manufacturers' Association to be held in Philadelphia, Pa., Tuesday, Wednesday and Thursday, December 10, 11th and 12th, 1889.

As announced in the official report of the proceedings of our last annual convention, the next yearly meeting will be held in Philadelphia, Pa., Tuesday, Wednesday and Thursday, December 10th, 11th and 12th, 1889.

This time and place was chosen by the Executive Committee after carefully canvassing the matter several months ago, and meets with much favor from members of the craft generally throughout the country.

In as much as this is our first convention in an eastern city there will undoubtedly be a marked increase in attendance from the Eastern and New England States while the Western and Southern craftsmen, having already felt the benefits gained from our yearly meetings, will take advantage of the opportunity to visit and become better acquainted with the Eastern brethren and by personal inspection acquaint themselves more fully as to the methods of manufacture now in vogue there.

The brickmakers of Philadelphia and vicinity are now all members of our Association and heartily interested and identified with us in the work, thus assuring a most cordial welcome to every one who can meet with us.

It is with no little pleasure therefore that we announce that arrangements

have been made for reduced railroad rates over all the leading lines in the Eastern, Central, Southern and Western States. A complete list of these lines will be given in the next issue of this journal together with the Programme which is now being prepared.

Anyone desiring further information as to the objects of our association with a view of becoming members will please address the Corresponding Secretary, Mr. Theo. A. Randall, Indianapolis, Ind., from whom also may be obtained copies of the proceedings of the last convention.

Respectfully,
THE EXECUTIVE COMMITTEE,
by R. A. SPEED, *Pres.*
T. A. RANDALL, *Cor. Sec'y.*

AN INTERESTING LETTER FROM ABROAD.

MY DEAR RANDALL:—The enclosed letter from Brother Stevens, of Philadelphia, although a private letter seems to me worth publishing as containing information of interest to the craft.

Sincerely your friend,

D. V. PURINGTON.

DRESDEN, Sept. 19, '89.

D. V. Purington, *Esq.*,
Chicago, Ill.:

MY DEAR SIR AND BROTHER:—Knowing how much interest you take in the subject of "Uniform Size of Brick," we thought we would examine and note the sizes used in the different countries through which we are traveling.

We find that they are far from uniform either in size or shape, over here. We have found some that measured only 6 in. long by 2½ in. wide by 1½ in. thick, and others 12 in. long by 6 in. wide by 2½ in. thick, with all sorts of intermediate sizes, so we have given up the idea of finding a "specimen brick" that would answer for a "standard."

Perhaps when we get into Egypt we may find one of the bricks, that Brother Adams told us about, which were made when Moses "run a brick yard," or possibly we may stumble over the "Tower of Babel" in our travels; if so we would be tempted to secure a "regular old brick" and bring it home for you.

On second thought I fear I could not, for they weigh our baggage, over here, and we have to pay so much a Kilo for the transportation, and I have no notion of exhausting my Letter of Credit and bankrupting myself in a foreign country.

I could, of course, bring it home in my hat, but then it would not look well for an "ex-president of the National Association of Builders of the United States" to come home with a "brick in his hat," would it?

I might possibly borrow Brother Watson's "Kodack," and send you a ground-plan and elevation of one, with a specification attached.

However, we will decide later what is best to do in the premises.

I trust you and all our Chicago friends are as well as we are, and enjoying yourselves as

much. Give our kindest regards to them all, and accept a share for yourself from

Yours very sincerely,

JOHN S. STEVENS.

[We are pleased to give place to the above for we know that very many of our readers will be delighted to hear from Mr. Stevens, who is one of Philadelphia's best known and most honored citizens. As President of the National Association of Builders, Mr. Stevens made hosts of warm, true friends who will ever remember his kindly, genial demeanor with real pleasure.—Ed.]

NEW INVENTIONS.

The following is a list of patents appertaining to brick, tile, terra cotta, sewer pipe, pottery, etc., and the machinery used in their manufacture, issued since our last number: (A copy of any of them can be obtained by sending 25 cents, the official price, to Chas. E. Brock, Patent Attorney, 925 F St., Washington, D. C.)

410,245. Burning Brick—J. M. Jameson, Los Angeles, Cal.

410,455. Tile Machine—W. D. Sherman, Omaha, Neb.

410,285. Mold for Tubular Articles—J. Kinzer, Pittsburgh, Pa.

410,788. Brick Kiln—S. Dewhirst, Voris, Mo.

410,742. Pot Furnace—M. V. Smith, Pittsburgh, Pa.

410,756. Pulverizing Mill—E. C. Griffin, Brooklyn, N. Y.

411,232. Brick Machine—G. Van Deventer, Matawan, N. J.

411,296. Brick Machine—J. W. and R. Penfield, Willoughby, O.

411,228. Brick Mold Sanding Machine—G. E. Smith, Kingston, N. Y.

411,010. Paving Brick—H. B. Camp, Tallmadge, Ohio.

411,069. Burning Clay for Ballast—C. M. Snyder, Mt. Pleasant, Iowa.

411,027. Clay Fence Post—W. H. Heindel, Majenica, Ind.

411,299. Roofing Tile—J. Rapp, Akron, Ohio.

411,726. Brick Kiln—V. Nielsen, Odense, Denmark.

411,645. Brick Machine—O. L. Dieckman, St. Louis, Mo.

411,546. Machine for Cutting Brick—W. R. Cunningham, Frankfort, Ind.

411,413. Machine for Making Building Blocks—J. C. Anderson, Highland Park, Ill.

411,463. Scoop for Clay Mills—E. J. Mildren, Black Lick, Pa.

411,690. Tile Cutting Machine—T. Somerville, Jr., Washington, D. C.

411,638. Tile Cutting Table—J. Bensing, Malinta, Ohio.

411,666. Roofing Tile—P. Liddell, Blake-man, Kan.



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Subscribers when ordering a change of address
should give both the old and the new address.

ADVERTISING RATES furnished on application.

Correspondence on all subjects of interest to Clay
Workers is solicited. Communications from prac-
tical men will always be welcome. Address all
communications to

T. A. RANDALL & CO.,

14 & 16 S. Tenn. St., Indianapolis, Ind.

THINKS IT FILLS A GAP.

Through the kindness of friends (the publishers having failed to extend us the courtesy) we have been favored with a copy of a new publication entitled "The Brickmaker," published by Charles T. Davis & Co. Chicago, Ill. In a long introductory the publisher says, in substance: That the organization of the National Brick Manufacturers' Association has resulted in the collection of a vast amount of information and that there is a demand for a readjustment of the principles and practices of brickmaking in all its branches, after centuries of misapplication; that the process will be slow, requiring judicious treatment and watchful care, etc. That the periodicals already established did not seem to cover the ground required, therefore there existed a gap which Messrs. Davis & Co. very kindly propose to fill.

However, there is a little matter of history with which Mr. Davis may not be familiar. The very same National Brick Manufacturers' Association was the Clay-Worker's own child, so to speak. The Clay-Worker first suggested the advisability of such an organization, heralded its coming, aided in the preparation of the necessary wardrobe, and from the first has provided a part, at least, of the lacteous supply necessary to the development of the infant's proportions and in due time aided somewhat in supplying the more substantial elements of food. So far as we have been informed by the craft the child has not wanted for anything. The process

of development may have been slow, but mature. No one has been mislead as to its real character. There are no abnormal developments in any of its parts. It is an easy matter to promise much in the way of "readjustments" but we have learned that business tact takes hold of things on the practical side.

We have not the least objection to the establishment of the publication above referred to. The field is open and promising to every one that will enter with the determination to labor for the benefit of the craft. Honest toil will be appreciated. Every practical idea hammered out and made a blessing will be gladly welcomed.

But few will believe, however, that the publications already established have left a wide gap for our new contemporary to fill. Indeed we think it will do well to keep up with the procession.

The craft has a very practical way of treating things, their experience in developing the best methods of working various kinds of clay, and the intricacies of their business has sharpened their wits to a point that they care little for theories that are not backed up by practical tests. It is one thing to discourse learnedly about readjustments, but the shrewd tact on the practical side will strip off the covering and show up the real, or as Butler's Hudibras puts it:

"Cannons shoot the higher pitches,
The lower we let down their breeches."

BRICK THE BEST BUILDING MATERIAL.

In spite of all that has been said of other building materials (whose name is now legion) brick is still, and is likely to remain the favorite building material. There is nothing except a Wedgewood crucible that will withstand fire nearly so well, and the smoothness and sharpness with which good bricks for fronts can now be produced with cheapness and dispatch, puts this material further in the lead of its competitors in their respective processes. Rough brick, while not intended for fronts or decorative purposes, are fully as good for party and inner walls provided they, as rough brick, are well made. Iron is confessedly unfit for building purposes where it may be exposed to the weather or fire and is rapidly going out of use. Stone will always have its uses in combination with brick and terra cotta, but stone will not weather any better in this climate than well burned brick, nor does it begin to withstand fire as well, besides even with

every improvement in the manipulation of stone, it is so much dearer as to leave it out of competition with brick for the heavy portion of the walls.

It is not maintained that there is not an inevitable and proper place for stone, but its use is necessary in an artistic, not in the utilitarian sense. A brick front or a building where walls were equally as massive as stone fronts, would be as strong or stronger, and certainly much less liable to injury from fire. But it will be observed that even in those buildings where stone is preferred either for its color, smoothness or general effect, massive walls of brick are used in the divisions and rears. The use of various materials is wise and the effect upon the architecture of a city is handsome, but when enthusiasts in one or the other materials assert a supremacy of their favorite over brick, they reckon without their host.

This is capable of historic proof. Egypt, the land of all others where stone was most available, dealt yet more heavily in brick. Along with her ruins of stone are yet to be seen imposing piles of brick, and sun baked brick at that, not more time-worn than the massive stones around them. While the sun baked brick of the cities of Assyria under that damp, hot climate became in course of ages, shapeless mounds, the kiln baked face bricks of that age are as sharp and clean as ever and testify to the indestructibility of a well made brick. Parts of the walls of Rome built by Aurelian, of brick, still remaining practically perfect in the ruins of those walls not utilized in the building of modern Rome. But it is hardly necessary to cite instances of the durability of brick. It's friends cannot add to its durability, nor its enemies say more against it than that a brick wall or building is not artistic.

But let us see about this. The rectangular cube known as a brick does not exhaust the brickmaker's resources. Lately, burned clay is springing into forms as fanciful as those of Alhambra. There is a mobility and springiness possible to terra cotta art that can only once be reproduced in stone and that once by an artist whose life work in that production has made it so expensive as only to be used in an art gallery. It is the mold against the chisel and while it may be equally difficult to make the mold as to carve the image, the mold is prolific of young till the offspring literally fill the earth. The art forms that are springing

into terra cotta as a medium of general culture are but a single step behind the printed book as an educator, and in fact, there is not so much difference in printing on paper with ink and on clay with forms.

OF THE PRESENT AND FUTURE.

Like "Little Puck," "we don't like to talk about ourself, but—" our readers will observe that we make another stride forward with this issue. Though we have received no orders for space by telegraph, the demand from our old patrons and a few new ones compels us to again enlarge the Clay-Worker, it now numbers 78 pages, which, considering that it is *not* a "special" issue, is a very creditable, and, to us, gratifying exhibit.

We have received too late for this issue several very interesting communications. The next (November) issue will be, we think, an exceptionally valuable number. Don't miss it on any account.

EDITORIAL COMMENT.

Our old friend and neighbor, John Hensley, looked in upon us recently shedding the bright light of his happy countenance throughout our sanctum. John, (we can't think of calling him Mr. Hensley), is now residing in Memphis, and is evidently much pleased with the Sunny South as a place of residence. He has been superintending the yards of the Tennessee Brick & Mfg. Co. the past season and reports a prosperous condition of affairs in that section.

It was our good fortune recently to visit the factory of the AMERICAN TERRA COTTA & CERAMIC Co., at Terra Cotta, Ill., and again break bread with our good friend and true, Wm. D. Gates, who is President and General Manager. We found them "busy as beavers" turning out a large quantity and fine quality of architectural terra cotta. They now have several large contracts under way and have already this season supplied a number of important buildings with their ware. We were especially pleased to note the many signs of prosperity plainly observable for it is meet that intelligent industry and scrupulous integrity, which here go hand in hand, should reap a full measure of success.

While at Galesburgh, Ill., recently, we availed ourself of the opportunity to call at the works of the FROST ENGINE Co. and inspect their Dry Pans and Engines.

The Manager, a most genial gentleman whose name we cannot recall, bade us a hearty welcome and in answer to our query "How's trade?" said they were quite busy and had had a prosperous season. Since they began to advertise in the Clay-Worker the former has become an important feature of their business. They find there is a growing demand for heavy machinery of large capacity for reducing clay to suitable condition for the manufacture of brick by the stiff clay process. Their Dry Pans seem to "fill the bill," for those who are using them are very well pleased, if we may judge from the many testimonial letters the Frost Engine Co. have received. From its massive appearance one is lead to believe that their Dry Pan is built for all time.

The good people of Detroit are to be congratulated on the success of their maiden effort in the Exposition line. The buildings, which were erected for the occasion, though large and commodious, were crowded with the products of American and foreign manufactories. The attendance was large and in every respect the Detroit Exposition was a pronounced success. In the machinery department we found THE NEW DUPLEX BRICK MACHINE in operation. The pile of brick haked near the machine, though mute, spoke volumes for the efficiency and perfection of the Duplex. The manufacturers, Messrs. F. Huettelman & Co., of Detroit, were pleased with the favorable attention paid their exhibit by visitors. The brickmakers in that vicinity, however, are one and all familiar with the Duplex and hold it in high esteem, as evidenced by the fact that it is the only brick machine now in use there. The manufacturers report a growing demand for the machine and state that wherever it has been placed in operation orders for additional machines have followed. This in itself is a strong recommendation for the Duplex—a cut of which may be seen on another page of this journal.

A representative of the Clay-Worker recently stopped off between trains at Keokuk, Iowa, and had a brief but pleasant chat with Mr. H. O. WHITNEY Gen'l Agt. of the well known ANDRUS BRICK PRESS. In company with Mr. Whitney a visit was made to the shops where a new extra heavy four-mold press was found in course of completion. It will doubtless prove a dangerous rival for trade honors for it has the appearance of

great strength and efficiency—qualities that have won a front place for the "Andrus" among the successful dry press machines. Mr. Whitney expressed himself as well pleased with the business of the present year and thinks the dry press process is rapidly gaining favor among the progressive brickmakers, at any rate the demand for the "Andrus" is increasing each year. The present season has been very prosperous and the next bids fair to be still better.

The Chicago Exposition attracts but little attention from the busy people of that most busy city, the visitors being mostly pleasure seekers from beyond the corporation lines, which, by the way, are rather hard to locate, for they are constantly creeping out into the prairie and converting farm lands into town lots, parks and boulevards, at a rate that is suggestive of magic. Those who do visit the old familiar place, however, find much the same "displays" that have pleased the eyes of the sight seers for several years past. The venders of peanuts, cider, etc., are still doing business at the old stands. We remember this distinctly for the reason that we made our last trip to the Exposition in company with our friend "Charlie" Raymond, of Dayton, O., and had much difficulty in preventing him from squandering a large portion of his hard earned fortune for those luxuries. In the machinery department we found H. BREWER & Co., of Tecumseh, Mich., exhibiting a line of brick and tile machinery. The most notable feature of which being Brewer's New Automatic Brick Cut-off, which worked like a charm. It is a novel device and will prove a valuable addition to this firms already large line of clay working machinery. Mr. Chambers, who had charge of the display, informed us that the new Automatic Cut-off has been attached to many of their brick machines during the past season, all giving entire satisfaction. Just beyond the Brewer exhibit is a large and attractive display of Conveyors and Elevators of various kinds made by the LINK BELT MACHINERY Co., of Chicago, who have improved their machinery till it is perfection itself almost. Their parcel or package carriers for conveying barrels, boxes, ores, clay, etc., etc., are great labor saving devices that must be seen to be appreciated. Those who cannot visit the Exposition and see this remarkable exhibit should do the next best thing, write the Link Belt Co. for an illustrated catalogue.

EDITORIAL NOTES and CLIPPINGS.

R. F. Beck will start a brick yard at Vicksburg, Miss.

The Standard Brick & Terra Cotta Co., New Straitsville, O., has been incorporated.

James McCullough will double the capacity of his brick yard at Quintette, Fla.

St. Louis is to have a new \$1,000,000 City Hall to be built of Missouri brick and granite.

The Brick & Terra Cotta Works at Alfred Centre, N. Y., are enlarging their plant.

The Rockwood Pottery Co., of Cincinnati, was awarded two gold medals at the Paris Exposition.

The Rochester (Pa.) Pottery Works recently destroyed by fire will be rebuilt at once.

Charles B. Whittemore, brick manufacturer, Pembroke, N. H., has gone into insolvency.

The Chicago Retort & Fire Brick Works have filed a certificate of dissolution.

The Spa Spring Brick Co. has been organized and will erect works at or near Perth Amboy, N. J.

The Elgin (Ill.) Brick & Tile Co. has sued D. H. Haeger, of Dundee, Ill., for \$50,000 for breach of contract.

C. W. Clark and T. T. Johnson have organized a company to manufacture brick near Little Rock, Ark.

The American Encaustic Tiling Co., of New York, are thinking of erecting new works in New Jersey.

The Hermetic Fire Brick & Clay Co. has been incorporated by Foster C. Griffith, of Trenton, N. J., and others.

H. V. Hardwick and others, of Almon, Ga., have organized a company to build brick and tile works; capital stock, \$30,000.

The brick and tile works of Kier Brothers, at Salina, Pa., were destroyed by fire recently, the loss being \$4,800.

Wm. Boyle, Jas. M. Bailey and others, of Pittsburgh, Pa., have organized the Pittsburgh Clay Pot Co., with capital of \$160,000.

Mayor Kirk, of Syracuse, N. Y., and others, will organize a company with a capital stock of \$100,000, to manufacture brick and terra cotta near there.

The scheme to organize the brick manufacturers who supply the New York City and vicinity markets into a monopoly will probably not succeed.

Fletcher & Thomas report their fall trade as booming, with the prospects for the coming season away ahead of former years, especially throughout the South and Southwest.

Mr. C. Scotten, formerly of Moark, Ark., in renewing his subscription, writes: "I am now located at Ft. Wayne, Ind.,

and am thinking of going into the brick business here, so I can't do without the Clay-Worker. Ft. Wayne is growing rapidly. The brick business is good, the present yards being unable to supply the demand."

J. B. Clough, of Deland, Fla., has contracted with Chas. Kaestner & Co., of Chicago, for a two-mould Brewis Brick Press, Clay Pulverizer, Shafting, Pulleys, Etc.

The Avery Stamping Co., Cleveland, O., say they don't know much about corrugating rolls but can give any information wanted in regard to Corrugating Buckets, Etc.

The Builders Material Co., of Seattle, Wash., have added a large Eureka Dry Press Machine to their plant. It is the first machine of the kind started in Western Washington.

Jno. Dillon, Sec'y and Treas. of the Charlemagne Lumber Co., Montreal, Canada, desires information concerning the dry press process with a view of engaging in the business.

The Steelton Transfer Co., have purchased another Martin Steam Power Brick Machine, together with Horizontal Pug Mill, Elevator, Crusher and attachments, for their new yard at White House Station, Pa.

Murrell Dobbins, the well known brick manufacturer of Philadelphia, says the past season has been the worst for brick-making in that section of any for twenty-five years, owing to the excessive rain storms during the summer.

Thomas F. Burbank, superintendent of the Bay State Brick Co., Boston, Mass., while driving home from the works on Monday, Oct. 7th, was run into by an express train on the Fitchburgh railroad and instantly killed.

Geo. Hoertz, of 2011 Third Avenue, Louisville, Ky., advertises for bids for ditching a four hundred acre tract of land. See his ad. in the "For Sale, Wanted, Etc." column, or, better, write him for particulars.

The Diamond Fire Clay Company, of Urichsville, O., are endeavoring to purchase the output of the Globe Sewer Pipe Company, of Pittsburgh, Pa. This will put the aggregate output of that district into the hands of one firm, giving them entire control of the market.

Tiffany Pressed Brick Co. received an order in May for their brick to be shipped to Ellensburg, Wash. Ter., and it was followed by several orders in June and July from the same point. They are now filling an order of 15 car loads for Seattle. The freight on these cars average \$370 per car.

The Rome Brick Co., Rome, Ga., have not been able to supply the demand for their pressed brick this season. They are unequalled in the South for rich red color and great strength. They are shipping them to Savannah, Brunswick,

Atlanta, and other points in Georgia, and to Birmingham, Bessemer, Anniston, Ft. Payne, and many other places in Alabama. They have a capacity of 100,000 bricks daily, winter and summer, which are burned in Morrison's Improved Kilns.

We are indebted to the Akron (Ohio) Roofing Tile works for a sample lot of their roofing tiles which they now make in a dozen or more different shapes. Their latest, and, we think, handsomest style, is the "Spanish" tile. They are ornamental in form the glazed tiles being a rich dark brown color making a beautiful as well as most durable roof.

Chicago capital has purchased a controlling interest in the Canton (Ohio) Standard Brick Company. The large remodeled iron-sided and iron-roofed six-story mill plant now used for making brick, will be adapted for sewer pipe making, and new brick works, constructed just south of the present kilns, which use oil gas, for burning 200,000 bricks at a time.

The Decatur Tile Co., Decatur, Ill., have made no tile this season but have turned their attention to the manufacture of brick for street paving. They have six round down-draft kilns holding about 38,000 bricks each, and three large square or oblong kilns holding 100,000 each. They are also building another large kiln to hold 100,000. They make an excellent quality of paving brick from common yellow clay.

We call special attention to the advertisement of Mr. B. J. Wilson on page 272 of this issue. Parties having capital to invest would do well to correspond with Mr. Wilson, who, owing to advanced age, wishes to retire from active business, and, therefore, desires to dispose of the right to manufacture his machine to some young, enterprising man, who can give the business the active, earnest attention necessary to insure successful results.

The McLagon Foundry Co., of New Haven, Conn., have favored us with a copy of their 1889 catalogue of their "Brickyard Equipment." It is a large, handsome pamphlet and contains some excellent engravings of their "New Haven" Horizontal Brick Machine with full detailed description of same together with other brick yard appliances. Every brickmaker should write them for a copy, which, we presume, will be sent free of charge.

The Dover Fire Brick Co., Cleveland, O., are building a large paving brick plant at Strasburg, O. They already have large fire brick works at Dover, but the growing demand for good pavers has induced them to build the new plant. They have an extensive bank of fine clay for the purpose and will equip the works with the best machinery and appliances for the work. They expect to be making 50,000 pavers a day by Nov. 1st. The president of the company, Mr. C. S. Barrett, tells us that the brick pavements put down in Cleveland have so far given

THE CLAY-WORKER

VOL. XII.

INDIANAPOLIS, IND., NOVEMBER, 1889.

No. 5

Written for the Clay-Worker.

EXAMPLES OF AMERICAN BRICK AND TERRA COTTA WORK.

No. 21.

THE BROAD STREET PASSENGER STATION.

The Philadelphia terminus of the numerous lines of the Pennsylvania Railroad, was opened to the public in January, 1882, and is now well known throughout the country.

The arrangement is peculiar, owing to the fact that the railroad tracks, after crossing the Schuylkill River, are carried on a brick arcade along the south side of Filbert Street, at a considerable elevation above the street, and enter the station at a level of the second floor. The first story thus becomes a kind of basement and is so treated architecturally.

The front on Broad Street measures 193 feet 5 inches, and the depth on Filbert Street is 122 feet 10 inches. On the right, about 80 feet of the frontage is occupied by ticket offices, baggage room (departing), 30x73, and a lobby, 40x80, for passengers in connection therewith, which lobby contains stairs and elevators to the waiting-rooms on second floor. On the left, about 34 feet is occupied by the exit staircase, behind which is the baggage room (30x80) for arriving baggage. The central portion about 80 feet is left open from front to rear providing for carriages to which passengers have access from either street under cover.

In the second story the entire frontage on Broad Street is occupied by the ladies' waiting-room (29x80) with private room

(13x28) and toilet attached and the dining room (29x74.) The restaurant (40x50) opens from the dining room and is served by private stair and dumb-waiters from kitchen above. The general waiting-room (50x80), adjoins the ladies' waiting-room and the restaurant. It is approached by the entrance stair and elevators from first floor and opens on the train lobby (30x190), extending the whole length of the building on rear

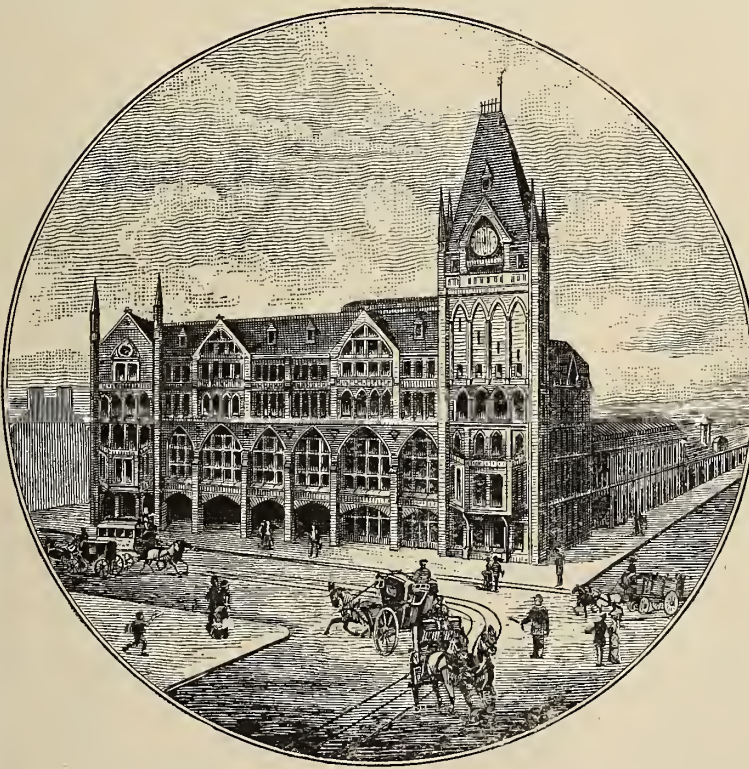
gentlemen. The train-house which begins at the gates from the lobby, extends about 450 feet in length to Sixteenth Street, being carried across Fifteenth Street on girders. It contains eight passenger tracks and platforms.

The style of the building is a modern adaptation of Gothic architecture. The eastern or principal front is divided into six unequal bays by piers and buttresses flanked on the north by a clock-tower, and on the south by a gable, in which are the openings to the exit hall and stairs. The tower and two bays next to it include the ticket offices, lobby, entrance stairs, etc., the other bays being open through on the street level, so that carriages may drive under.

The piers are carried up, from their granite bases, in terra-cotta as far as the springing of the large windows of the second story, the jambs of which are decorated with slender terra-cotta columns, two to each side with enriched shafts and caps, from which rise the great arches of elaborate terra-cotta work in three orders.

The transom lights are kept rectangular, forming spandrels under the arches which are of terra-cotta richly decorated. Over the piers between these arches are circular panels contain-

ing finely modelled heads typical of the races of humanity, indicating the cosmopolitan character of the institution and its widespread benefits. The upper stories being occupied by offices of the company, are more plainly treated, and the openings are made smaller and more numerous to suit necessary subdivisions. At the level of the fourth floor a balcony is got in the thickness of the wall, the



PENNSYLVANIA RAILROAD PASSENGER STATION, PHILADELPHIA.

Wilson Bros. & Co., Architects.

(Fifteenth Street) and communicating with trains by gates. The exit stair descends directly from this lobby, and a baggage lift is provided at each end, connecting with the baggage rooms for arriving and departing baggage. The offices in the upper stories are approached from this lobby by a private stair and passage on the Filbert street front which also affords access to the toilet rooms for

face above being set back and the line of the wall face below carried up by buttresses, through which openings are pierced, making the balcony continuous. Two of the bays of this front are carried up through the cornice and form gables, which contain windows, lighting an attic story extending over the whole building and serve to break the otherwise long lines of the cornice. The front on Filbert Street is treated in a similar manner, extending from the clock tower to the bridge crossing Fifteenth Street and connecting with train-house.

The granite work is executed with extreme simplicity, the blocks being large, and the natural unworked surfaces being used wherever practicable. The mouldings and enrichments there used are bold and simple in character. The terracotta work, on the other hand, is very elaborate. The individual pieces are small, and plain surfaces are avoided as much as possible, to obviate the difficulties met with in manufacturing large pieces and the bad effects of warping and shrinking. Delicacy and elaboration of detail naturally follow, qualities which characterize the ancient Italian work and also the best modern English essays in this material. The red brick is relieved by bands of moulded brick of the same color at intervals, which serve to break agreeably the plain surfaces without destroying the solid effect. The interior is thoroughly carried out in the same style as the exterior.

Written for the Clay-Worker.

BRICKMAKING AND BURNING.

No. 7.

BY J. W. CRARY, SR.

[Copyrighted.]

A fixed national standard for the size of brick is of so much importance, that the entire brickmaking interests should concentrate in a movement to accomplish it. There are scarcely two manufacturers in the same place who make brick of equal size. There are many serious objections to this unnecessary difference. It has been said that it arises from the difference in the shrinkage in the clay. This is true where the same size of molds are used in different clays, but why not make the mold or die to suit the clay? After one kiln of brick has been made of any peculiar clay, it is easy to see what size the mold should be, to make a certain given standard size of brick. The best size of bricks for convenient handling, and easy drying, without flaws or cracks, is about 8 $\frac{1}{4}$ x4 $\frac{1}{2}$ x2 $\frac{1}{2}$

inches. This gives nearly 80 cubic inches to a brick which should be the standard size.

THE ADVANTAGES OF A STANDARD SIZE.

1st. Builders could use any make of brick in the same wall. 2nd. The transportation and hauling under similar circumstances would be the same. 3d. A fixed rule could be established for making estimates for brickwork. 4th. The most important manufacturers would not be trying to get the advantage of each other by changing the size of their brick and the buyers and consumers of brick would not be imposed on by having to take a small brick when they expected a larger one. There is no advantage in making a large brick. A brick should be made that will dry quick, heat quick, burn quick, cool quick, and just large enough for an ordinary hand to grasp two. If a man who is pitching brick has to take one in each hand, he loses time, but if he can grasp two with one hand he can work with ease and handle two about as quick as one. So with the "setter." If he sets skintling or zigzag, he can put down two bricks in right place with one hand. I have often set brick as fast as two pitchers could well and easily pitch.

2 $\frac{1}{2}$ inches is thick enough for a brick. A thin brick will carry more weight or pressure in proportion to thickness than a thick one for the reason that when a brick is crushed by pressure it, will fracture so as to leave a cone, the vertical slope of which will be in proportion to thickness, so that a wall built of thin brick and best cement mortar will carry more crushing weight than one built of thick brick. I would suggest that the National Convention of Brickmakers be held at some central point and the whole subject of size and manufacture be discussed and decided upon.

A CONVENTIONAL UNDERSTANDING FOR SIZE AND QUANTITY OF BRICK A NECESSITY.

To have the best and most reliable brickwork and building, it is of primary importance that some uniform, authoritative rule shall be fixed for the size and strength of a brick and also for its capability to stand fire. It would not be necessary to fix a standard that would require the best and strongest brick, for it would be impossible to supply the demand. There are, comparatively, few clay beds that will do to make the strongest kind of brick or clay goods of any kind, so the standard brick would have to be such as could be made of fair, average clay of the country, and if better

than the standard brick should be needed and required for some special work, the best clays would have to be used. All brick laid on the outside of a wall should have such fire qualities as would stand the heat of a burning building. A well built "party wall" as well as outside wall, should stand fire so that the brick will not scale or shell off. There are many kinds of clay that will stand great heat, but will shell off; such, for instance, as the clay bordering on Lake Ponchartrain near New Orleans, La. All this kind of clay should be well pulverized and pressed dry enough to go right into the kiln, then it will stand fire nearly equal to good fire brick and the brick are much stronger than if made of soft tempered clay. If brick walls have good foundations and are well built, they will stand intact after the building is burned and can be used as at first.

Some architects have said that no wall will stand a fire and be as good as at first building. Most architects know more about drawing a picture of a house than they do about the real, true art of building it. As I said in my first article, I am at home on a building with trowel in hand, and I always insist on having my own way about setting joists or any other timber going on the walls. I do not think a man can claim to be a first rate brick layer, unless he can set wood work or iron work on his walls so that when the building burns down, the falling timber or iron will not pull down the wall. Joists should be cut with a bevel at each end so that there will be a good bearing at the bottom and not more than two inches of the wall left resting on the top. If iron anchors are needed, they should be thin and wide as the joists are thick, and flat on the bottom of the joists, so that when the joists are burned so as to fall, they will hang to the wall or pry out the brick. Fires all on one side of a wall will expand and curve it a little, but as soon as cool, if well built, it will readjust itself and be as good as when first built. I have said this about the proper use of brick because there are many good brick that have to stand silent and defenceless and bear the sins of botehers and the aspersions of novices and the slander of ignorant and captious critics who never had sufficient intelligence to get a respectable introduction to a brick.

BRICKMAKING AND BURNING SHOULD BE A PROFESSION.

The public, generally, will never be able to get a first rate brick until there

is a good supply of well trained, intelligent and thorough makers and burners. The fact that a man be an old brick burner is no guarantee that he can invariably produce a first class kiln of brick. There are many old burners who look upon brick burning as a matter of luck and when they make a very excellent burn they speak of it as something out of the ordinary course of events when, in fact, they happened to follow the well known causes which produced their natural effects. If a brickmaker and burner thoroughly understands the nature of his clay and fuel, and how to use both to produce the desired results, he can be as sure of a good burn as of anything else. There is no occult art or secret about burning brick when all conditions are filled, which an intelligent understanding and good, practical judgment will suggest.

WHEN, HOW, AND WHERE, CAN A MAN LEARN TO BE A FIRST CLASS BRICKMAKER?

He can learn any other art at any place where it is practiced, but he may learn to burn brick at Philadelphia, Baltimore or any other single place, and if he should go to some other place where the clay is materially different, he would be a mere novice. Then what shall he do to get the art of brick burning so as to be master of it? Until there be a school or university for teaching the art in all sorts and kinds of clay, fuel and kilns, the only possible way to master the art is to visit all the good brick factories in the whole country where the clay is different or peculiar in its nature. He could work at each place long enough to see a kiln set and burned. It would probably take him five years, supposing he had the intelligence, perseverance, industry, physical energy and aptitude to thus pursue this art. As I have said before in these articles, the phenomena always arising and presented by varied and various experience in clay-working is so manifest, that it will be a long time before the world will be able to exhibit or point to a perfectly finished clay-worker but we can have first rate brick for any purpose if the brickmakers will concentrate their efforts to accomplish the object.

One of the chief faults in the progress of the art of brickmaking has been to consider the making of brick as the *primary* object when, in fact, it is the *secondary*. What is the use of having a brick machine that will make 100,000 brick for \$100, if, after the brick be made, they

are only half burned? What is needed now to make real valuable progress, is a plan to make a good supply of first rate *brick burners*. A man may invent a good brick kiln or machine and then not be able to demonstrate it by his own skill. The success of "Dry Press" Machines has been greatly retarded by incompetent brick burners.

Written for the Clay-Worker.

WHAT CLAY HAS DONE FOR HISTORY

BY PROF. R. T. BROWN.

In the age of superstition there was a mythic story of a magical mirror which, on one side, at the bidding of the magician, would be shown any of the events that mark the past history of our race, and on the other could be pictured the future of persons or of nations, as the conjuror might will. We have nearly realized this wild fancy, at least so far as relates to the first side of the magic mirror. Our mirror is made of clay! It consists of the resurrection of authentic records of events which had been entirely lost to history, or had been, by the critics of this age, relegated to the domain of fabulous history. These events are inscribed on tablets of clay in the ancient Assyrian characters.

Near the close of the last century a school of critics appeared in France, and later in Germany, whose mission was to cast a doubt on all that remained to us of the history of antiquity. They began by an attack on sacred history, but not satisfied with, what they supposed to be a successful assault on Jewish history, they discovered that the laws of criticism which they had adopted in this case would be equally fatal to all the annals of ancient history. Berosus, Thucydides and Herodotus were each, in turn, consigned to the domain of skepticism, or doomed as mere narrators of myths.

This spirit of distrust with regard to everything ancient extended down to the middle ages, and even approached so near modern times as to threaten the robbery of Shakespeare, of his well-earned honors.

This school of criticism was sapping the foundation of ancient history—indeed it was undermining all history; for the arguments with which it assailed the leading features of antiquity were equally fatal to all collateral evidence that might be adduced. The actual manuscript, if ever there were such, have perished centuries ago—the monuments of Egypt told only of the existence of a

people far advanced in the arts; but who they were and when they lived were unanswered questions. The ruins of Babylon and Nineveh were dumb, or spoke only in a mysterious voice of an unknown people. If Berosus, if Herodotus or Strabo have written of the magnificence of these cities—if Jewish history has detailed the time and the character of these peoples, the critic has only to challenge the existence of such historians and refer the books ascribed to them to the genius of some modern forger, and demand the proof of their authenticity.

At this crisis Champollien appears as a student and interpreter of Egyptian inscriptions, and a reader of the hieroglyphic characters in which many of these were concealed. In the rainless climate of Egypt these were fairly preserved; but the triumph of the French archæologist bid fair to be limited to that climate. In other cities of antiquity, inscription on marble, or on tablets of brass, were so effaced by time and weather as to no longer be legible.

The exploration of the ruins of Babylon and Nineveh, undertaken by an English antiquarian society, unexpectedly brought to light, well burned clay tablets and cylinders covered with inscriptions in the Assyrian language, every letter of which was perfectly preserved, notwithstanding the march of centuries that had passed over them. This discovery excited the scholars of this age, and the researches into these treasures of ancient literature have, within the last ten years, been prosecuted with great energy and with astonishing results. Not only in the capitals of the Assyrian and Medo-Persian empires have these libraries of clay literature been found, but in the region of the upper Euphrates and ancient Mesopotamia, in Moab and in ancient Phœnicia and Syria. The discovery of these ancient tablets is a recent event, but already have these earthen tablets and cylinders confirmed many statements of ancient historians, both sacred and profane, upon the correctness of which a doubt had been raised by the critics; and many problems in regard to ancient nations, and their relations to each other, have been solved that were beyond the reach of solution in the light of our best historic records.

Herodotus and other Greek historians, aided by the light of Jewish history, have preserved a fair record of the dynasties of ancient Egypt, but a night of oblivion

had settled down on the more ancient empire of Assyria—the first and greatest of the four universal empires that have ruled the world. This darkness was relieved only by—now and then an incidental remark of a Greek or Jewish writer, but the imperishable clay records are revealing the lost history of that most ancient empire.

The tablets have confirmed all that Herodotus wrote of the size and magnificence of Babylon, and the extent and power of the empire of which it was the capital. They have given us an Assyrian version of the unfortunate expedition of Senacherib to conquer Samaria; and their account of the conquest of Judea and the destruction of Jerusalem by Nebuchadnezzar, very nearly corresponds with the bible history of that event.

The mystery that has long overshadowed that ubiquitous people called the Hittites, in bible history, is likely to be cleared away by these Assyrian tablets. We learn from this new source of information that in its best days Assyria exercised dominion over the whole region from India, on the east, to the Red Sea and the Mediterranean on the west. This population was chiefly herdsmen shepherds, who, like other semi-civilized people, were broken into clans or smaller nations (for the word Hittite signifies broken), but whatever name the clans might bear the whole group were Hittites. Lately discovered clay cylinders refer the conquest of Egypt and the establishment of the dynasty of the shepherd kings to these Hittites.

But it is not my purpose to detail the revelations of this new discovery; but rather to bring into prominence the fact that the indestructible property of well burned clay has been the means of preserving the record of events and the history of nations that would have been forever lost but for this. It is, however, probable these nations on the great plains of the Euphrates resorted to clay as a writing material from necessity rather than from choice. But having mastered the art of clay writing, they used it for all important documents such as title deeds, contracts, diplomatic correspondence and historic annals.

It appears somewhat strange to us, that in the absence of stone or metal fit to retain inscriptions, these early artists should have stumbled, apparently by chance, on the only absolutely imperishable material known to science to-day. But perhaps those brickmakers of Shinar had a more accurate acquaintance with

the properties of matter than we give them credit for. At least, they have demonstrated that even in this world of change, the annals of history may be committed to a material substance that will defy the "tooth of time."

A question has been raised as to the reliability of the translation of these clay documents; but the Assyrian language being from the same root as the Hebrew, with which scholars are already acquainted, there is no serious difficulty in mastering these inscriptions.

These researches have but begun—what they may lead to, belongs to the other side of the magic mirror into which we have not yet looked. Enough is already known to justify the conclusion that history is indebted to clay for knowledge that it could not have acquired from any other source.

Written for the Clay-Worker.

HINTS ON BRICKMAKING.

No. 41.

BY "R. BRICK."

HOW TO CONSTRUCT A FLOOR DRYER TO UTILIZE EXHAUST STEAM.

An excellent floor dryer can be constructed in the following manner to use either exhaust or live steam or both:

Grade your floor with a fall of six inches in one hundred feet, have the highest end next the boiler, cover this surface with one-inch steam pipe, in 100 feet lengths; lay these lengths of pipe in parallel lines and six inches apart from center of the pipe. These pipes connect at right angles, with header pipes at each end. The receiving header, that is, the one nearest the boiler, connects with a pipe which in turn is connected with the exhaust pipe. These three pipes should be of equal size and the steam should enter the receiving header at a point equally distant from each end, so the steam will be distributed equally through it. The header at the opposite end can be one less diameter. It should be two inches lower at one end than at the other. At the lower end place a globe valve a little smaller than the header pipe, with this regulate the volume of escaping steam and water. Some use steam traps, but these are no better than a globe valve of sufficient size. At either of receiving header pipes should be a one-inch globe valve, to drain this pipe. By placing a globe valve in the exhaust pipe above the point of connection with pipe leading to dryer the steam can be allowed to escape through it without passing through the dryer.

After pipes are laid and straightened there will be four and a half inches of space between the lines of one-inch pipe, lay a line of burned bricks with their ends together, so that their top surface is one-half inch higher than the pipes, fill space between the lines of brick with mud, covering pipes one-half inch, then over all lay a pavement "herring-bone" style, of smooth, hard bricks, bed them in mud as they are laid, they will be supported by the bottom bricks so that the pipes have no weight on them, and can expand and contract without breaking. The header pipe at the lower end should rest on skids so it can move when the pipes expand with heat and return when they are cold. The live steam pipe runs from boiler to exhaust pipe, and at night it can be used when the engine is idle. The heat is uniform all over these floors.

Where 25 horse-power is consumed the exhaust will heat a floor 50x100 feet or 5,000 feet of surface. On a floor of this size where live steam is used at night, so that the floor is not allowed to cool down at night, ten thousand sq ft mud brick can be dried every 24 hours, or of stiff-mud brick set on end 15,000 per day can be dried.

Pipes for a floor of this size fitted and put in place will cost about \$800.00, and requires about 35,000 bricks.

Nearly all floors of this kind that have been built, did not have the pavement of bricks on top; some have only the string courses with mud between, this makes a poor floor, as the mud is soon cut out; others have tried cement with like results. All seemed to think a course of brick would prevent the floor from heating. This, however, is a mistake, for when once heated through the floor is just as hot with the pavement as without it. I demonstrated this to my entire satisfaction. We have a steam floor constructed as the one described and it gives better satisfaction than any other of the kind of which I have any knowledge.

The next question to determine is, Does it make back pressure on the engine? We find that by letting the steam escape freely from the discharging header pipe, the back pressure is hardly perceptible; if, however, we fail to do this the pressure against the engine becomes strong.

If the escape is sufficient the only pressure is, so far as I can see, the friction of the steam passing through the pipes—no more back pressure than in sending

steam a hundred yards through a pipe, except that it passes through a series of small pipes, and the combined surface of this is much greater than one large pipe, hence more friction. This makes a good, permanent dry floor, and is especially adapted to drying repressed and ornamental bricks or drain tile.

Written for the Clay-Worker.
SEWER PIPES AND THEIR MANUFACTURE.

BY ALFRED CROSSLEY.

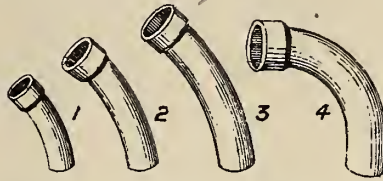
[CONTINUED.]

The thickness of the pipe and depth of the socket are matters in respect to which various rules have been proposed from time to time, and in which some makers have worked by no rule at all except the rule of thumb, producing very disproportionate results.

Probably the best rule in regard to thickness, is the one now generally adopted in England, as specified by the leading sanitary engineers, viz., for fire clay pipes one-tenth the diameter, and for stoneware pipes one-twelfth the diameter. This rule, applied to many of the pipes made in this country, would reduce the thickness of the smaller sizes, and increase the thickness of the larger sizes. Mr. Stephen E. Babcock, in a paper read before the American Water Works Association, at Cleveland, Ohio, stated that in his specification for vitrified stoneware pipe for an extensive water works system, he required the thickness to be one-twelfth the diameter, and remarking that this was heavier than the ordinary pipe. He also stated that for part of the work he used the ordinary depth of socket, $2\frac{1}{4}$ inches, but for other parts he required the depth of socket to be 3 inches. One very good rule proposed, as to the depth of socket, is for any size up to 10" in diameter 2" deep, and all above that size one-fifth the diameter. These are important matters that should not be left to the whim of each individual manufacturer, but should be decided by a representative body of sanitary engineers, so that some uniformity might be secured.

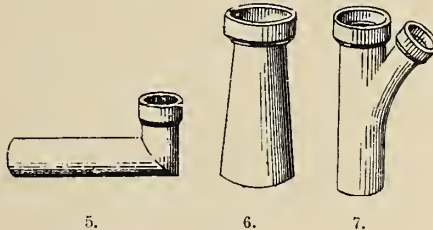
The connections and fittings used in sewer construction are somewhat varied, and consist of traps, branches, bends, elbows, and others. There is a considerable difference between the American and English nomenclature of these fittings, and as I think from an impartial criticism the American names are largely inappropriate and somewhat misleading I present below the illustrations of

the fittings in most general use, with the English and American names appended, so that my readers can judge for themselves which are the most appropriate and convey to the mind the most correct idea of each article. The names I have given are those in most common use in each country.



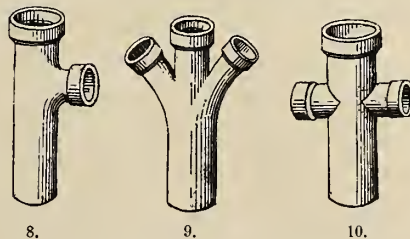
English Name.—1. Bend. 2. Bend. 3. Bend. 4. Bend.
American Name.—1. Curve. 2. Curve. 3. Curve. 4. Elbow.

I may say that although four bends are shown above, it is usual to make but two, known respectively as eighth and quarter bends, representing the number of each that would be required to describe



English Name.—5. Elbow. 6. Taper pipe. 7. Slant Junction, single.
American Name.—5. Square Elbow. 6. Increaser. 7. Y Branch, single.

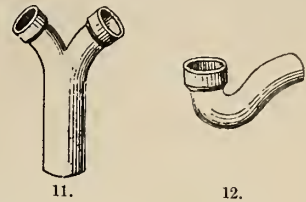
a circle. The curve, as usually made in America, is full pipe length, whereas in England it is only half pipe length. The elbow is also in England made with the joint at an obtuse angle, and is then called a bent elbow. The taper pipe as shown above is the only style made in England, that is to enlarge the capacity of a sewer



English Name.—8. Square Junction, single. 9. Slant Junction, double. 10. Square Junction, double.
American Name.—8. T Branch, single. 9. Y Branch, double. 10. T Branch, double.

at one or more points to accommodate the increased flow from laterals or side drains. In America the reverse fitting is also made, and hence necessitates the use of the distinguishing terms, "increaser" and "diminisher." The latter was surely never made to the order of any sanitary engineer, for it must be contrary to com-

mon sense to ever diminish the capacity of a drain or sewer. With regard to



English Name.—11. Y Junction. 12. P Trap.
American Name.—11. Breeches. 12. P Trap.

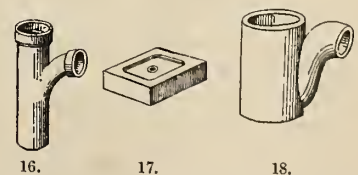
junctions or branches, it can easily be seen that the American terms of Y and T branches are an evident misnomer, and should be discarded for something better. A great deal of absurdity exists in the matter of junctions and branches



English Name.—13. S Trap. 14. Syphon Trap. 15. Syphon with Inlet.
American Name.—13. S Trap. 14. Running Trap. Hand-hole Trap.

both in England and America. Take for instance a 12" pipe, it seems contrary to common sense to bring into it a 12" branch, but the height of folly is reached when a second branch of the same size is brought into it, making a double 12x12 branch, that is, three streams converged into one of the same size. For if it be really necessary to have a 12" pipe from each of three directions to accommodate the flow, how can one of the same size carry the combined flow. This is another matter also that I think should be under the control of some well-defined scientific rules. Again there is the matter of the square branch, both single and double, which is contrary to all right principles. As a matter of fact many sanitary engineers condemn this, and require all side drains to be brought in at an acute angle.

Where it does happen to be really necessary to make a connection at a right angle, a branch like No. 16 should be used,



called in England a "curve junction."

This form should in fact entirely supersede the square branch, but so long as the engineers and consumers do not insist on it, the manufacturers will still go on making the old square branch. In the one case a short neck of socketed pipe stuck on to the main, is only need-

ed, whereas in the other a proper bend has to be moulded and stuck on, and is consequently more costly to make. The maker should be recompensed for the extra cost and the square branch prohibited altogether. One of the most useful and general fittings to drains in England is the gully trap and grate for yards. I believe I am correct in saying, that so useful has this been found that it is regarded as a necessity, and that no house is allowed to be occupied in any English town until one of these has been provided in the yard connected with the house. I may here remark also in parenthesis, that the owner or builder of all new houses in an English town is compelled by law to make proper drainage connections from each house to the street sewer, and these drainage connections are not allowed to be covered up until they have been inspected and approved by the Borough Surveyor (same as our City Engineer) or his deputy. America is a smart and progressive country, but she may learn a few lessons yet from her old slow coach of a mother. The accompanying cut (17) shows one of the gullies with grate detached. The usual size is 9" diameter, 18" deep, and 4" branch, with dished grate 18" square set on top, to the rim of which the yard is paved so that all waste surface water runs into it. Other forms and sizes are also in use, but this is the most common. This affords a direct connection with the drain, while from its form all sewer gas or smell is effectually trapped, and also all solid matter or other foreign articles are kept out of the drain proper, and deposited in the bottom of the gully, from whence they are easily removed at intervals as required. This forms a most convenient method for disposal of slops and dirty water, instead of either pouring down the kitchen sink or throwing out into the street, as is too commonly the case in the average American town. Beside that, in time of heavy rainstorms, the surface water is quickly run off, instead of standing about in pools till either absorbed or evaporated, to the discomfort of the householders. When we reflect that the greater heat of our climate here renders the exhalations from dirty water thrown out on the open ground more noxious even here than in England, it will be seen that the improved method of disposal of such is an even greater necessity as a means of preserving health. I have been much surprised that the gully trap for yards has never been adopted here, and hence I think no

apology is necessary in trying to bring the matter before the notice of our intelligent readers. I need hardly say to the manufacturers, that it is to their interest to push their introduction, for if once generally adopted, the consumption would be very large and a source of great profit to the makers.

In connection with the difference in names for the same articles by English and American makers, I would say that in one instance, viz., the Garnkirk Fire Clay Co., of Glasgow, Scotland, they have names somewhat similar to the American, although differing in many respects from both the styles named. It is interesting also to notice that this firm in the general name of the pipes as a whole come pretty near to the name in use here, viz., glazed sewerage pipes. In the old country, as a rule, they are called sanitary pipes, and in fact the exception noted above is the only one I know of. With regard to the comparative merits of the two names, "sanitary pipes" and "sewer pipes," either one of them is appropriate, presenting as they do a connection of ideas between the pipe itself and the principles that have brought it into existence, but I must confess that my preference is decidedly in favor of the American name "sewer pipe," as being the most distinctly appropriate, and the least ambiguous. I am the more free to say this after my previous criticisms of other names mentioned.

Written for the Clay-Worker.

BRICK FOR STREET PAVING.

The very general interest manifested in the use of brick for street paving induced us to make a visit to the cities of Bloomington and Decatur, Ill., to see the result of several years use of this pavement.

In the year 1876 while at Bloomington attending to some business of a personal character we witnessed the laying of one square (in length) of brick paving, which was laid on the west side of the Court House square, this street being one of the principal traveled streets in the city.

The method of the construction we remember quite well—not differing materially from the present approved method. The brick were furnished and laid by Mr. N. B. Heafer, a well known brick manufacturer of that city.

On arriving at the city of Bloomington our first point of interest was to examine the pavement laid in 1876, which we found to be in good condition after thirteen years use. All the repairs that have

been made in this time have been those necessitated by the laying of water and gas connection which always leaves uneven surface, after the work is done and the fillings settle. Otherwise the pavement is apparently good for as many more years wear. The brick used in the laying of this pavement were selected from ordinary building brick, the hardest brick being used for this purpose, and were not equal in hardness to those required at present.

We visited the brick yards of Edgar M. Heafer (a son of N. B. Heafer) from whom we learned that the brick being used for street paving in the city of Bloomington at this time are made from a good quality of yellow clay and burned in the ordinary updraft kilns. The burns are as hard as the character of the clay will allow. The hardest brick are selected for top pavers, and any well burned brick will do for the bottom course of pavers. The remaining brick of each kiln are used for building purposes.

The advantage of using the common sizes of brick is apparent. If some of the brick are not suited for paving they may be used for other purposes occasioning no particular loss. The difference in price being a small matter.

The city of Bloomington, after fully testing the use of brick, has abandoned the use of all other kinds of material for paving. The street leading directly from the railroad station building to the central portion of the city was paved probably fifteen years ago with limestone but has worn into holes and is now being paved with brick. Also Grove Street, another of the principal streets, was macadamized a few years ago at considerable expense but has also worn into holes and is now being paved with brick.

Altogether the city has paved over six miles of her principal streets with brick pavers.

We conversed with a number of business men and it is the general verdict without an exception, that it is the best pavement that has so far been introduced for their use, and they have tried wooden blocks, stone, macadam and asphaltum.

The average cost of the pavement is estimated at \$1.50 per square yard which includes grading, curbing, etc.

The streets paved with brick are smooth, clean, and in every respect desirable travel-ways, and they give to the city a substantial appearance.

We next visited Decatur which is one of the live cities of Central Illinois and

has some beautiful suburban additions. Here they began to use brick for street paving six years ago, and the result has been so satisfactory that they now have over eight miles of streets paved with brick.

THE METHOD OF LAYING THE PAVEMENT at this place is as follows: The street is brought to the grade required, which is but little crowning—probably four inches on a street fifty feet in width. The street is then rolled with a six ton cast rollers. Then a layer of sand is spread four inches thick on which a layer of good common hard brick are laid flat but lengthwise with the street and tamped down solidly with a heavy tamp, leaving an even surface. A two-inch layer of sand is then spread, care being taken to fill the interstices of the flat layer of brick, after which a course of what are called in this market "black hards" are set on edge crosswise of the street, breaking joints same as in building; these are tamped down solidly, leaving the surface as even as possible. Over the surface a layer of sand is spread of sufficient thickness to fill all the spaces left in laying by the common travel of the street, and the surface is again rolled several times with the cast roller. Both layers of brick are set as close as possible by hand so as to leave the smallest spaces only.

THE BRICK

used for the top course are very hard indeed. We examined those manufactured by the Decatur Tile & Brick Co., of Decatur. They are made from common yellow clay. The clay is carted directly from bank to pit where it is wet and allowed to soak one day, then it is carried by elevator to crushers, and then pressed by a McKenzie machine. There are three streams of clay issuing from the dies, the brick are end cut, then dried and burned in down-draft kilns until they are vitrified.

In using the word "vitrified" in this case, we mean it. A brick that is not vitrified through as solidly as it is possible to make them when taken from the kilns is the exception. As an evidence of their character it is sufficient to say that in delivering on the streets the brick are pitched from the wagon by hand into piles, the same as boulders are handled, and there is seldom a broken brick. The brick have a bright black glaze, the result of vitrification and not from any other cause.

In an interview with Mr. J. G. Shea and Mr. Stafford who have charge of the works we learned that they use six ordi-

nary round down draft kilns, each kiln holding 38,000 brick, besides, they have three large square or rather oblong crowned kilns, that hold about 100,000 each, one of which is a Eudaly kiln.

The proprietors claim that the advantages from burning in crowned kilns are that they can better control the heat, increasing the temperature to the highest point that the brick will stand and not run together and then hold them at this degree of heat until well done, then cool slowly, which serves to toughen the fibre of the brick. Four specimen brick made by this company picked up at random were submitted to a test by the Chicago Forge & Belt Co., the crushing resistance was found to be 250,000, 228,000, 210,000 and 318,000 pounds respectively. The brick measured $7\frac{1}{4} \times 2\frac{1}{4} \times 4$ inches.

Mr. Shea informs us that numerous samples of clay have been sent him to burn, to test their quality for street paving, and that he has succeeded in making good pavers of all with but one exception. He further says that any good common clay may be so tempered, made into brick, and burned, as to make good pavers; that the clay that is used by the Decatur Tile Company is only a common clay and difficult to manufacture into either brick or tile. That some clays are much better than others admits of no doubt, but the idea that the clay adapted to the manufacture of pavers is the exception should be combated. Clays adapted to this use can be found in great abundance.

We conversed with several property owners who have had to bear the expense of the improvement of their streets and in no instance did they complain of the expense in view of the advantages gained.

HOW LONG WILL IT LAST PROBABLY?

And the reply almost uniformly would be, "It looks like it might last twenty-five or thirty years." The more enthusiastic would reply, "Fifty years with a little repair occasionally." The street paved six years ago is traveled more probably than any other in the city and yet it has not cost a penny for repairs. And still it is admitted that the character of the material used now in the construction of the pavements is much better, that is, harder and more tenacious.

THE REPAIRING.

After twenty years of wear if it is necessary to repair, the expense will be small compared with other pavements.

The grade of the street and the foundation layer of brick will be in tact and

many of the top brick will be good so that a renewal of the pavement after twenty or twenty-five years of wear will not be expensive.

THE CONTRACT PRICE.

The pavements that are being laid at this time costs as follows: \$1.32, \$1.37 and \$1.40 per square yard, which includes grading and curbing complete. The difference in price depending upon the grading.

Written for the Clay-Worker.

CONVENTION BRICKDUST.

No. 4.

Brother Members we are called upon by our honorable executive committee to congregate our aggregated wisdom in Philadelphia, Penn., on the 10th, 11th and 12th of December, 1889, and I trust every progressive brickmaker in the land will be there. All are cordially invited without regard to race, color or previous condition of knowitalliveness. If any are afflicted with the last named complaint and will attend the coming session of the N. B. M. A., they will be discharged either as cured or hopelessly incurable.

Brethren of the craft, from whatever section of this great country you may come from, you will feel amply repaid for your time and outlay of money, first, because no brickmaker has ever attended one of our annual sessions in good faith without realizing that it pays. Again you will have an opportunity to see one of the finest cities on this continent or any other. This is true for several reasons. If any of you will mount the tower in Fairmount Park, or any of the towers of the city you will behold a panorama that will make you proud of your profession. You will see between the Delaware and Schuylkill rivers, and west of the latter, as far as the eye can see, blocks, acres and square miles of beautiful red pressed brick walls, dotted here and there with some majestic pile of stone or iron. Towering head and shoulders above all competitors is the new City Hall, probably the finest structure in the new world, with its tower four hundred feet high and still moving heavenward—slowly but surely it has been rising for twenty years, and I sincerely hope that its mighty foundations may not be disturbed, by the after dinner eloquence of our honored ex-presidents, or that of the "brickmaker to the president," to say nothing of the petrified eloquence of my esteemed friend, formerly of Philadelphia, more recently of Denver, Colorado. Again, there is Inde-

pendence Hall, where the immortal Declaration of Independence was signed, and the historic bell that peeled forth the glad tidings—here you can see the birth place of the greatest nation the sun shines on. And about five hundred of the best looking and most enterprising brickmakers this great nation has produced. And last but not least, you will be cordially welcomed and delightfully entertained by the Philadelphia brickmakers, with many of whom the writer is personally acquainted.

They can give us some valuable points on brickmaking, especially the manufacture of pressed and ornamental bricks, and we of course will drop a few chunks of brickbat wisdom among them that may bring forth fruit.

Let us all be there, and those of us who travel on a cross-tie ticket must start in good time, and help pass that "chestnut" resolution about limiting members to five minute speeches, and only one speech on each subject, unless the speaker chooses to speak longer or oftener.

Before this little cloud of "dust" settles among the old iron and brickbats I must say a word about poor Gates of Terra Cotta. While our hungry looking brother had his faults, he was a pretty good sort of an individual, and if in my troubles and trials and loss of valuable head gear at Memphis I said anything that I am sorry for, I am glad of it. While I felt that retribution (of heaven) would overtake Bro. Gates, I did not hope or expect fatal consequences. I hope he is better off, poor fellow; that is, I trust he will have a new hat this winter, of *his own*. I also hope this apology will be satisfactory to Mr. "Fair Play," who so cleverly defended Bro. "G." May he have to burn bricks with sawdust and putty without a patent kiln.

Bro. "Fair Play," if you step up and acknowledge the error of your youthful ways I will give you the right hand of fellowship, and put a spoonful of brick-dust in your ear, and you will go home thinking you are the greatest brickmaker on the earth.

Again I say to every brickmaker, come, and bring your partner and your superintendent, and your cousins, and your wife's people, and although I have grown gray in the service and am threatened with baldness (now don't think of that venerable "chestnut" about a "brick in my hat") and may be mistaken for an envelope needing a stamp, at the play, I am and always will be, your friend.

A—C—MEMBER.

Written for the Clay Worker.

SOME FINE EXAMPLES OF TERRA COTTA.

The visitor making the rounds of our national capital and on the lookout for specimens of architectural display in the line of bricks and terra cotta, will be very highly gratified. The writer was in Washington some months past—not there for an office or position in the Government employ, nor any lobbying scheme, but went with his eyes and ears open to see and learn all he could of bricks and those who make them.

It is quite the thing to do, to visit our Governmental buildings, monuments, etc., and the National Museum of course is one place that has many attractions.

The Pension Department Building is a fine building built of brick, stone, and terra cotta. The terra cotta belt course which extends entirely around the building, above the first story, is a piece of work that will strike the attention of most persons very forcibly, and more particularly those who were participants in the march and encounter this panel is designed to commemorate.

The design represents the different arms of the service, marching in files in one direction. Infantry, cavalry, artillery and the navy are each represented, with a rear guard of footsore, wounded, sick and otherwise disabled veterans, hobbling along together with the wagon train and ambulance corps.

Few indeed are the old soldiers who can look at the figures represented in this piece of work and not be stirred by a tide of memories, that dates back to the times when we "marched and fit" from '61 to '65.

On entering the National Museum the first, or almost the first object that arrests the eye of the observer is a pulpit of terra cotta. It stands just inside and to the left of the door as one enters the building. The top of the desk, the treads of the steps, and rail is of black walnut. The balance of the pulpit entire is of clay ware. Part of the columns and the raised flower work ornamenting the side of stair and railing is done in blue glaze. The whole piece is highly ornate, and is well illustrated in scriptural designs, representing the preaching of the word.

The piece of work is from the works of H. Doulton & Co., Lambeth, England, and designed by Geo. Tinsworth. Another piece of terra cotta ware designed and executed by the same parties is a

baptismal fount of exquisite workmanship and design.

The fount stands about four feet in height. The basin proper being about three feet in diameter, octagon in shape, supported at the angles by beautiful columns, which are supported by the base or pedestal of the fount. The basin is enameled in blue glaze, also the ornamentation of the columns, and raised flower work of the capitals and frieze above. Four doves are seated on the rim of the basin facing inwards. The columns below are supplemented with another row of shorter columns, above and between them are ornate panels of scriptural designs representing child life as taken from sacred history.

There are in all eight of these. To the reader familiar with bible history it is an easy task to recall to mind the story of Jairus' daughter, Christ blessing the children, the call of Samuel, the sacrifice of Isaac, and others. These are very faithfully portrayed in the work. The beauty of this piece of work can hardly be surpassed in wood or metal, and it is made of a material so little used for such purpose that it commands our admiration.

This work was exhibited at Philadelphia in 1876 at the Centennial Exhibition, and later was presented to the National Museum and is No. 75,383 on the list.

We regret very much our inability at the time to secure an engraving or photograph of these works of art, from which engravings, might have been made and shown, much better than a mere description, which fails to convey to the general reader the real meaning or true value of the design.

BRIX.

"OUT OF SIGHT---OUT OF MIND."

Postmaster General John Wannamaker, Philadelphia's great merchant, is regarded as the best all around advertiser in this country. He understands the art—and he knows how to forcibly express himself about advertising.

Recently Mr. Wannamaker said: "To discontinue an advertisement is like taking down your sign. If you want to do business you must let the public know it. Standing advertisements, when changed frequently, are better and cheaper than reading notices. They look more substantial and business like and inspire confidence. I would as soon think of doing business without clerks as without advertising regularly.—*Sunday Times*.

RELIABLE BRICK MACHINERY.

The illustration to which we invite your attention represents the largest size or "A" Ohio Brick and Tile Machine, manufactured by Fate and Freese, of Plymouth, Ohio. Its massive proportions and unequalled strength, as well as its simplicity and the evident special adaptation of all its parts to the purpose for which they were intended, cannot fail to interest brickmakers in general, and especially that large and unfortunate class who have experienced the vexations and losses incident to the use of weak and inefficient machinery.

This firm, whose specialty is clay working machinery, manufactures three sizes of these machines, having a capacity of from 10,000 to 40,000 brick per day and

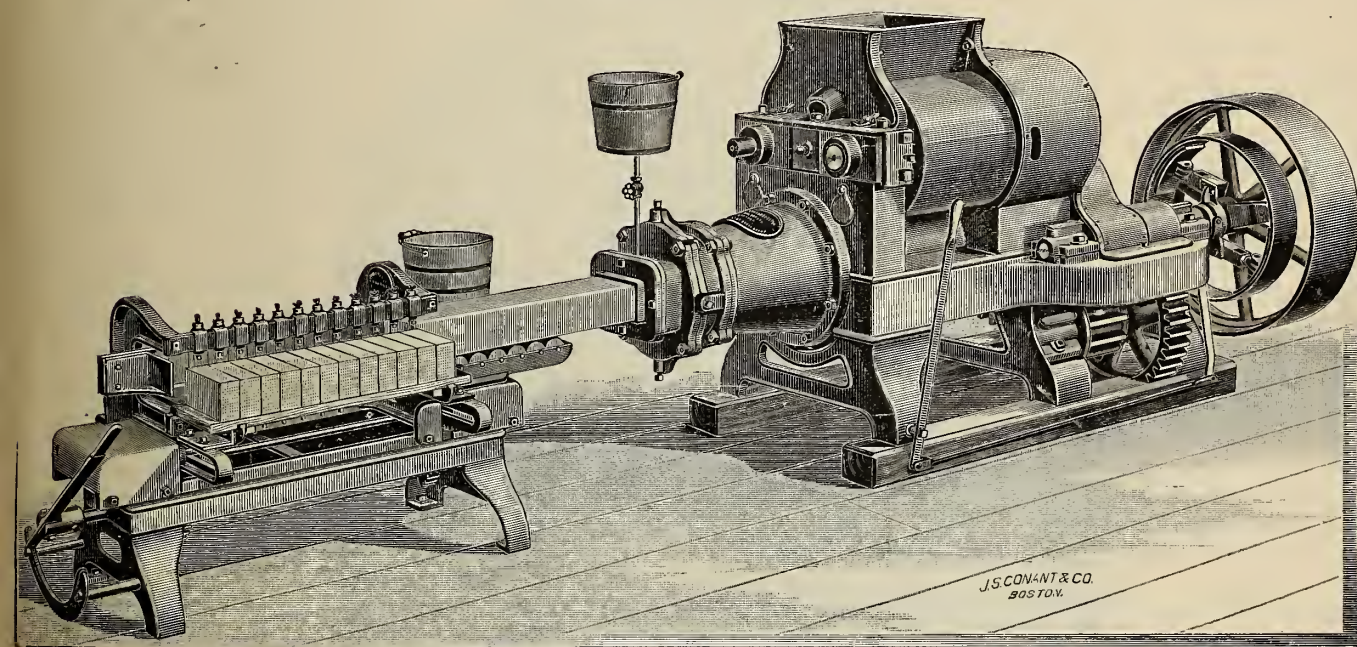
The leading features which have been secured in these machines are—certainty of producing the best and most perfect ware. Absence of all parts which would require special skill or care in their management, and the greatest freedom of every part from liability of breakage or serious wear.

The material of which these machines are constructed is strictly first-class, steel being largely employed. Their high degree of mechanical exactness admits of the perfect duplication of any part.

The new lubricating die, shown in cut, invented by Mr. Freese, is said to have no equal for its purpose, both as regards the form and the texture of the brick produced by it. Many of them have been

output of the machine and at the same time it is laborious and troublesome in operation.

With the Table here shown there is no waste whatever. It is operated entirely by one lever, one stroke of which cuts off twelve brick and at the same carries the delivery board or pallet under the cut brick. The return of the lever carries out the loaded pallet and returns the Table to its place ready to again receive the continually advancing column of clay. The operator does not touch the clay either before or after the cut is made. Its work is rapid and it leaves the brick in a perfect condition. It can be used with any auger machine and no one making brick by this process can afford to be without it.



"A" OHIO BRICK AND TILE MACHINE WITH BOARD DELIVERY CUTTING TABLE.

other ware in proportion, thus meeting the wants of all customers. Their machinery is designed by Mr. E. M. Freese, who has charge of the manufacturing department, and whose determination since engaging in this business has always been to give the users of clay-working machinery something much better than could be had elsewhere. He has, during the present year, completed the A and B sizes of the Ohio Brick and Tile Machines, in which he has embodied new and important improvements not found in others. These have been developed by careful observation of the variety of material and men to which this class of machinery should be adapted and by persistent study to originate plans, and proper tests to prove their practical value.

in use during the past season in a great variety of clays with most satisfactory results. It is not lined with sheet metal, but is more substantial and durable.

His most recent production is the Brick Cutting Table here shown.

Readers of the Clay-Worker will remember reference being made some time since, by an English correspondent, to the Board Delivery Cutting Table which had come into general use in that country.

The Freese Table has all the desirable features of the English table and in addition, has important advantages. The principle upon which the brick are cut by the English form of table necessitates two waste ends or imperfect pieces at each cut, which amounts to a loss of from 10 to 20 per cent. of the entire

The manufacturers take pleasure in answering all inquiries concerning their machinery and desire to send their descriptive Catalogue to all interested.

Address FATE & FREESE,
Plymouth, Ohio.

OUR WEATHER OBSERVATIONS.

Weather fair, very fair. Sunshine in our office—witness our growth in this number—and it is a normal, healthy growth. Orders for advertisements are not crowding upon us by telegraph, but they get here.

Indications for the future: Weather fine, very fine in the "Hoosier Capital;" A little windy in Chicago; local, however, and not serious.

PHILADELPHIA SKETCHES.

THE ANNUAL MEETING.



LIBERTY BELL.

The National Brick Manufacturers' Association will meet in annual convention at Philadelphia, on the 10th of December next, and will continue in session on the 11th and 12th. We anticipate a large and interesting convention (1) because it furnishes the best opportunity to every one interested in the manufacture of brick to become acquainted with the improvements in that art which have been made within the past year. Important as the press is, and its importance can hardly be exaggerated, yet there are many improvements in the details of the business that will never appear in print. These can be gathered only in the personal intercourse of the workers. These may each be small in themselves, but in the aggregate we can hardly overestimate them. (2) The social element of this organization commends it to every brickmaker in the nation, and no one thus engaged can afford to forego the advantages it offers. (3) The session for the present year will be held in the historic city of Philadelphia and will afford an opportunity to examine some of the most interesting mementoes of our early national history. Here stands the first Temple of American Liberty.

INDEPENDENCE HALL.

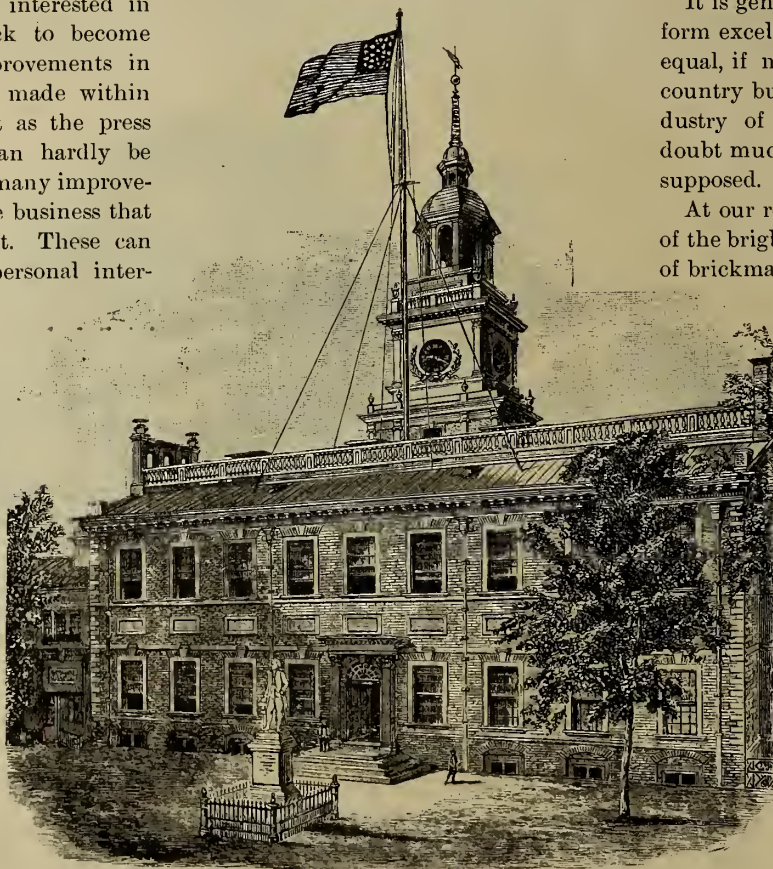
Like a number of other buildings in that city, it was built with imported brick and its excellent state of preservation testifies the durability of brick as a building material in no uncertain terms. To those who have never visited the city of "Brotherly Love," and in the West there are many such men, it will be a memorable event to stand in the hall where the sages of this nation pledged to each other and to the colonies, "their lives, their fortunes and their sacred honor to maintain the independence of the

new born Nation." Here was proclaimed the fundamental principles of human governments—truths that burst on the nations of Europe like a thunder peal from a clear sky and shook the thrones of the old world. Go, stand in that hall and renew your patriotism!

Philadelphia has been the home of many notable men who achieved great distinction and honor. Among the greatest of this nation's statesmen whose memories we revere for their patriotism and philanthropy, the name of

BENJAMIN FRANKLIN

stands foremost and there rests his mortal remains. The portrait of his



INDEPENDENCE HALL.

masterly face which looks up from the opposite page was taken from a terracotta tablet made by the Boston Terra Cotta Co., to whom we are indebted for the plate.

Dr. Franklin was, at least as far as this country is concerned, the father of the Utilitarian philosophy. His life was devoted to the study of the Useful. Even his discovery of the identity of lightning and electricity, which was the initial step in the control of atmospheric electricity, was made with a view of securing life and property from destruction by this mysterious power. The final

success of the revolutionary struggle depended more on the sagacity and practical wisdom of Dr. Franklin as Minister Plenipotentiary at the court of France than has ever been credited to him. Philadelphia was his home; here he performed that wonderful feat of self-education that made him the true type of American character. To walk the streets that Franklin walked, and to look at the same scenes that he admired, is worth a pilgrimage to Philadelphia. Go to the Convention and you will return a wiser, more patriotic and a happier man.

PHILADELPHIA BRICK MARKET.

It is generally conceded that for uniform excellence, Philadelphia brick are equal, if not superior to any in this country but the extent of the brick industry of that commonwealth is no doubt much greater than is commonly supposed.

At our request, Mr. F. B. McAvoy, one of the brightest of the younger generation of brickmakers of that city has compiled

the following estimates, which are thought to be nearly exact and correct. Mr. McAvoy is a native of Philadelphia and is, therefore, perfectly familiar with the subject.

The past season has been an unfavorable one owing to frequent and heavy rains, the older manufacturers claim that it is the worst season they have had in 20 years, so the season of 1888 has been made the basis of the calculation.

A SEASON'S WORK.

Number of hand gangs, each containing 2 men and 1 boy, 560; each gang make on an average, during a season, 350,000 making

a total of 196,000,000 brick made by hand.

Number of machines in use also name was viz.: Chambers, 13; Martin, 12; Peerless, 2; Excelsior, 2; Tiffany, 1; Tallcot, 1. Total 31, which made 154,000,000 brick.

GRAND TOTAL.

Hand and machine brick . . .	350,000,000
Value of product	\$ 3,500,000
Capital invested	\$ 3,000,000
Number of employes	4,000

The repress or pressed brick, was 35,000,000 or 10 per cent. of the total product. The ornamental and enamelled, 2,000,000.

There are employed to repress these bricks, independent of the gangs who

make them, about 140 gangs, consisting of 1 man and 2 boys.

There is at least 100,000,000 brick made within a few miles of the country line that are nearly all brought to the Phila-market.

There is also in Philadelphia, 13 fire brick works, employing 300 men and produce goods to the value of \$636,000.

MASTER BUILDERS' EXCHANGE Of Philadelphia.

This prosperous association is now occupying its new building on Seventh St. between Chestnut and Walnut Streets, which has been reconstructed during the past year and especially adapted to the needs and purposes of the Exchange.

From basement to roof the entire building, which has a frontage of 75 feet on Seventh Street and extends back 100 feet, is devoted to the use of the Exchange and its members. In the basement the Master Builders' Mechanical Trade Schools will be located, where a course of instruction will be given in Carpentry, Bricklaying, Plastering, Stone Cutting, Plumbing, Painting, etc., etc.

The first floor is entirely given up to a permanent exhibit of building materials. This department will be open to the public and no doubt prove an attractive feature.

On the second floor front is the general meeting room of the Exchange, 75x40 feet, together with committee rooms, toilet rooms, etc. The balance of this floor and the four floors above, which, with a series of galleries surround an open court, contains numerous well lighted offices for members, architects and others identified with the building interests.

It is a fitting and elegant home for the Exchange and its members and will doubtless be taken as a model by exchanges of other cities when building for themselves.

By courtesy of the directors of the Exchange the use of their rooms are extended to all who attend the convention of the National Brick Manufacturers' Association, who are cordially invited to make the Exchange headquarters

during their stay in the city of "Brotherly Love."

Those who wish can have their mail addressed to them in care of the *Master Builders' Exchange* and may feel assured that it will be carefully looked after by the genial secretary, Mr. William Harkness, and his able assistant, who, seemingly, find pleasure in attending to the wants of fellow craftsmen. Certainly they spare no pains or trouble to make all who patronize the Exchange perfectly comfortable and happy.

Directly opposite or across the street from the Exchange Building is

THE CONVENTION HALL,
where the coming meeting of the

A special feature of the Institute is a school of instruction in drawing, embracing the mechanical, architectural and freehand branches, which has been maintained uninterruptedly since 1824. Two years later the *Journal of the Franklin Institute* was first published. It is a monthly devoted to science and the mechanic arts and has been issued regularly ever since, till now it is considered a standard work of reference. It is in the lecture room or hall of this honored Institute, where so many learned men and ambitious scholars have met together for counsel and mutual benefit, that the fourth annual convention of brickmakers will be held in December next. It is to be hoped that the spirit of the meeting will be in keeping with the place.

HISTORICAL NOTES.

As many of our readers will visit Philadelphia next month in attendance on the annual session of National Brick Manufacturers' Association, they will probably be interested in a few historical notes of that city.

Philadelphia belongs to a grant of land made to William Penn by Charles II in 1680. The first settlement was made by a colony, chiefly Friends, in 1681. The name "Phiadelphia" (meaning brotherly love) was selected by Penn himself. His purchase of the land from the Indians after having received a grant from the British

crown is a fact characteristic of the man.

The State House, now known as Independence Hall was begun in 1732 and completed in 1735. In this building the Colonial Congress held its sessions, and here on the 4th of July, 1776, they signed the Declaration which made the thirteen colonies an independent nation.

For many years Philadelphia was the chief commercial city of America, and after New York had secured this distinction, it still held its position as the monetary centre of the nation till the expiration of the charter of the United States bank in 1832. It was the seat of the American Congress till 1800. In 1876 the great Centennial exhibition was held in West Philadelphia from May till October.



BENJAMIN FRANKLIN.

National Brick Manufacturers' Association will be held in the Lecture Room of FRANKLIN INSTITUTE of which our readers may be pleased to know something.

The Franklin Institute, of the State of Pennsylvania, was founded in the year 1824, for the purpose of promoting the mechanic arts, and is among the oldest and best known educational institutions of that State. The first exhibition of American Manufactures held in the United States was made under its direction in that year. The institute now has a Library containing over 32,000 volumes and 18,000 pamphlets which are exclusively scientific and technical in character.



OFFICIAL ANNOUNCEMENT AND PROGRAMME

Of the Fourth Annual Convention of the National Brick Manufacturers' Association.

To the Members of the N. B. M. Ass'n.
GENTLEMEN:—

As announced in the official report of the proceedings of our last annual convention, the next yearly meeting will be held in Philadelphia, Pa., Tuesday, Wednesday and Thursday, December 10th, 11th and 12th, 1889.

PLACE OF MEETING.

The Convention will meet in Franklin Institute Hall on Seventh Street, between Chestnut and Market Streets. The following is the

PROGRAMME.

FIRST SESSION, TUESDAY, 2:30 P.M.

Roll Call.

Reports of Officers.

Enrollment of New Members.

President's Annual Address—

Robt. A. Speed, Memphis, Tenn.

Election of Officers.

Paper, "Theory and Practice of Brickmaking"—

J. W. Crary, Sr., Bluff Springs, Fla.

Discussion of same.

NOTE: Each subject presented for consideration will be discussed by members of the Association when the speaker has finished.

TUESDAY EVENING, 8:00 P.M.

Second Annual Pow-wow under the auspices of the Philadelphia Brickmakers Protective Association, held in St. George's Hall, southwest corner Thirteenth and Arch Streets.

SECOND SESSION, WEDNESDAY, 9:30 A.M.

1. "Brickmaking in New England," address—
Geo. M. Fiske, Boston, Mass.

2. "Moulded and Ornamental Brick," essay—
James Taylor, Long Island City, N. Y.

3. "A Common Sense Talk on Brick and Brickmaking," address—John Cubbins, Memphis.

4. "Drying Brick," essay—
Edmund Webster, Philadelphia, Pa.

5. "Repressing Brick," discussion led by
J. A. Baggs, Bridgeport, Ohio.

THIRD SESSION, WEDNESDAY, 3:00 P.M.

6. "The Key to Success in Brickmaking,"
W. H. Brush, Buffalo, N. Y.

7. "Advantages and Disadvantages of Making Brick by Hand," address—
Jacob Dowler, Philadelphia, Pa.

8. "Some Lessons Learned in Thirty-five Years of Practical Brickmaking," address—
Hon. Geo. S. Oldfield, Norfolk, Va.

9. "The Stiff Clay Process," essay—
W. H. Alsip, Chicago, Ills.

10. Question Box.

FOURTH SESSION, THURSDAY, 9:00 A.M.

11. "Hints to the Inexperienced in Brickmaking" address—
J. A. Reep, Knoxville, Tenn.

12. "Paving Brick, their Manufacture and Use," essay
J. H. Calkins, Galesburg, Ill.

13. "Burning Brick," address—
Thos. R. McAvoy, Philadelphia, Pa.
14. "The Dry Press Process," essay—
S. J. Rose & Son, Chester, Pa.
15. "Burning Dry Press Brick," discuss on
Led by—
16. Question Box.
FIFTH SESSION, THURSDAY, 3:00 P.M.
17. "Evolution of the Brick Machine," essay—
Geo. S. Tiffany, Tecumseh, Mich.
18. "Experiments in the Manufacture of Fuel for Burning Brick,"—
A. J. Baker Denver, Col.
19. Question Box.
Report of Committees.
Miscellaneous Business.
Adjournment.

It has been thought best to make up the programme entirely from members who have not heretofore addressed the Association in a formal manner in order that the current of thought and experience may be broadened and deepened. While in this manner it is hoped to obtain "new blood," we are assured that those who have rendered such valiant service in former years will be with us and again lend their welcome voices and good cheer, joining earnestly in the discussions as of old.

Directors, will be thrown open to members and visitors during the convention. All are cordially invited to make the Exchange headquarters during their stay in the city. Those desiring it, may have their mail sent to them in care of the Master Builders' Exchange.

REDUCED RAILROAD RATES

Have been obtained from all roads composing the Trunk Line Association, the Central Traffic Association and the Southern Passenger Association which include nearly if not all, the leading railways in the Eastern, Central, Southern and Western States. Over all these lines a two-thirds rate has been arranged for on the certificate plan as follows:

HOW TO SECURE REDUCED RATES.

1. Each person desiring the excursion rate must purchase a first-class ticket either limited or unlimited, to the place of meeting, for which he will pay the regular fare, and upon request, the Ticket Agent will issue a printed certificate of purchase.

2. If through tickets can not be procured at the starting point, parties will purchase to the most convenient point where su c



ST. GEORGE'S HALL, COR. THIRTEENTH AND ARCH STREETS.

HOTEL ACCOMODATIONS.

Special arrangements have been made for the entertainment of members and visitors with the Continental Hotel, located on Chestnut Street, corner of Ninth, which, it will be remembered, was headquarters during the National Builder's Convention, also with the Girard House, which is just across the street from the Continental, and the Washington Hotel, on Chestnut Street between Seventh and Eighth. All of these are conveniently located within a few minutes' walk of the Franklin Institute in which the convention will be held. Directly opposite from the convention hall is the Philadelphia

MASTER BUILDERS' EXCHANGE, which by courtesy of their Board of

through tickets can be obtained, and repurchase through to place of meeting, requesting a certificate from the Ticket Agent at the point where repurchase is made.

3. Tickets for the return journey will be sold by the Ticket Agents at the place of meeting at one-third the highest limited fare, only to those holding certificates signed by the Ticket Agent at point where through tickets to place of meeting was purchased, and countersigned by signature written in ink by the Corresponding Secretary of the Convention, certifying that the holder has been in regular attendance at the meeting.

4. It is very important that a certificate be procured, as it will indicate that full fare has been paid for the going journey and that the purchaser is, therefore, entitled to the excursion fare returning. It will also determine the route via which the ticket for return journey should be issued.

5. Tickets for return journey will be furnished only on certificates procured not more

than **THREE DAYS** before the meeting assembles and will be available for continuous trips only; no stop-over privileges being allowed on tickets sold at less than full fares. Certificates will not be honored unless presented within **THREE DAYS** after the adjournment of the meeting.

Should any station Agent fail to have a blank certificate a Receipt for the amount paid, stating that it is for one first-class fare and bearing the Agent's stamp should be taken and will enable the Secretary of the Association to obtain the reduced fare returning, and which cannot be done if no certificate or receipt is taken.

From all quarters—North, South, East and West—comes favorable and encouraging reports from our craftsmen who, without exception, express approval of both the time and place selected for our next annual meeting. There are unmistakable signs of increasing interest in the National Association and its work; many brickmakers who have not heretofore identified themselves with us are now joining the Association and will meet and participate with us in the work at Philadelphia. These indications of a constantly increasing interest on the part of individual craftsmen generally, is very gratifying for they bode a day of better things—a more rapid and general improvement in methods and products.

Anyone desiring further information as to the objects of our association with a view of becoming members will please address the Corresponding Secretary, Mr. Theo. A. Randall, Indianapolis, Ind., from whom also may be obtained copies of the report of the proceedings of the last convention.

All who are interested in brickmaking, whether directly or indirectly, are earnestly invited to join the Association, attend the coming convention and lend their influence and assistance in the effort to advance the craft to the high position it deserves among the great industrial interests of this Nation.

Respectfully,

THE EXECUTIVE COMMITTEE,

by R. A. SPEED, *Pres.*

T. A. RANDALL, *Cor. Sec'y.*

STRICTLY BUSINESS.

She was a maid of high degree,
And quite severely proper.
Each man she met, so proud was she,
Would love, despair, then drop her.
But there remained without demur,
When all the rest forsook her,
An amateur photographer,
An finally he took her.

—Life.

Written for the Clay-Worker.

TIMELY SUGGESTIONS.

Topics that Should be Discussed at the Brick Manufacturers Convention.

I am not a member of the N. B. M. A., but I am interested in the manufacture of brick and I would like to offer some suggestions for the consideration of the Association that ought to interest brickmakers everywhere.

It is not of improved methods of manufacture, but of improving the demand for brick to which I wish to call attention. We must do something to awaken the people to the importance of using only indestructible material in all buildings. Let each brickmaker look around him and see how many wooden houses are built to one of brick, and he will surely agree with me that something should be done toward educating the people up to a proper appreciation of the value of a brick. The thrifty mechanic who builds a modest house in the suburbs should use brick as well as his employer who builds a mansion. But it is in the country where we, the "village brickmakers," would like to see a revolution or the dawn of a new era in the manner of building. Not only should all residences be built of brick, but almost every other building on the farm. Barns and granaries could be built so as to be proof against cold and heat, and also practically fire-proof. Houses for the pigs and poultry, the ice-house and the carriage-house, should be built of brick. Then there are walks to be laid from the house to road, to the out houses and to the barn. There should be brick paving around barn doors, watering troughs and gateways for the comfort and welfare of the farm stock as well as their owner.

As the city brickmaker sees before him a widening market on account of the paving of streets, may not the village brickmaker in the not very distant future see a vision of brick paved country roads, creating a demand limited only by the ability of the people to buy?

We cannot increase the demand for brick by meeting in convention and exchanging ideas; this is all well enough so far as the making of brick by the best methods is concerned, but each brickmaker must work at home each in his own particular field by increasing the interest in the use of brick and by extending a knowledge of the benefits to be realized among the people.

Why would it not be a good plan for the N. B. M. A. to offer prizes for the best essays upon architecture in brick

with numerous plans for all kinds of buildings for various purposes from the most inexpensive that can be built to the most costly?

These essays should treat not only of architecture but also of the best manner of building walls for strength and dryness; of the composition of mortars and cements; of fire proofing floors, wooden beams and roofs and also of the comparative cost, in the long run, of brick and wood.

These prize essays and all other information likely to be of benefit to the trade could be published by the associations and furnished to members in such quantities as each might need in his business.

Then there are other matters. Do we not need a new kind of mortar? How soon the brick in a chimney become loosened and ready to tumble down? Cannot our inventors give us a mortar that will resist alternate heat and cold, wet and drought?

I think we have only entered the beginning of the age of brick. S. G.

Vermillion Co., Ill.

HOW TO BECOME A CAPITALIST.

Somebody, writes Washington Gladden, in the September *Forum*, must save money, and the people who save it will be the capitalists, and they will control the organization of industry and receive the larger share of the profits. If the workingmen will save their money they may not only be sharers of profits, but owners of stocks and receivers of dividends. And the working men can save their money if they will. It is the only way in which they can permanently and surely improve their condition. Legislative reforms, improved industrial methods, may make the way easier for them, but there is no road to comfort and independence, after all, but the plain old path of steady work and sober saving. If the working people of this country would save, for the next five years the money that they spend on beer and tobacco and base ball, they could control a pretty large share of the capital employed in the industries by which they get their living, and could turn the dividends of this capital from the pockets of the money lenders into their own. There is no other way of checking the congestion of wealth and of promoting its diffusion so expeditious, so certain and so beneficial as this. I wish the working people would try it.

CORRESPONDENCE.

THESE COLUMNS ARE OPEN TO ALL. THE FULL NAME AND ADDRESS IS REQUIRED BUT WILL NOT BE PUBLISHED EXCEPT WHEN PERMISSION IS GIVEN BY CORRESPONDENT. THOSE DESIRING TO COMMUNICATE PRIVATELY WITH ANY CORRESPONDENT WHOSE FULL NAME IS NOT GIVEN CAN DO SO BY ADDRESSING LETTERS CARE OF CLAY-WORKER.

Burning Brick.

Editor Clay-Worker:

I notice in the October number of the Clay-Worker, page 241, a communication from A. J. Kautz, Jr., Newport, Pa., asking for advice. First, I would advise that the brick be set on the plan illustrated in a recent number of the Clay-Worker, at least set the middle bench of the arch all loose, and each third course stretchers. Mr. K. says, "When we first set fire we dare not get through in less than thirty hours." I am not certain whether he means through the top of the kiln or meeting fires in the arch. Thirty hours is quick time to get the fire through to the top. My advice is to dry off the kiln slowly with wood or coke, then put on coal and fire moderately until the fire shows up all over the top, then put on the settling heat and make the required amount of settle in from 60 to 72 hours, put on straight hard brick for platting, and keep them well closed up while settling.

My opinion is the kiln is fired too fast, the top bricks are not given time to become thoroughly heated.

The first object in burning a kiln of brick is to burn them well. Fuel and time are secondary matters and should never interfere with the success of a burn. In this case the setting may prevent free passage of heat from the arches.

Rome, Ga.

R. B. MORRISON.

Reply to "A. Skimmer."

Editor Clay-Worker:

I read your letter in the October Clay-Worker, and can hardly say whether I was surprised or amused. If you make the statement in earnest that you sell brick for \$5.25 per M and \$2.97 of that is profit, it is one of the surprises of my life. I have bought a good many thousand dollars' worth of experience in the brick manufacturing business (machine process) but I never was so fortunate as to get any at your figures. I admit that my experience though costly, has taught me but little, and I claim to know but little about brickmaking now, but I admire and commend a man who has mastered the art to so successful a degree as you.

If you make \$2.97 profit out of \$5.25, the making costs you only \$2.28, which is an achievement worthy of note. However, if you were only joking the "Village Brickmaker" in your letter, I would kindly beg of you to do it no more, as you might persuade him to attempt the impossibility of making brick at \$2.28 per M which would cost him the profits of many years hard toil.

A. PAVER.

Tacoma, Wash.

Why Brick Are Made by Hand.

Editor Clay-Worker:

I suppose we will have to grin and bear it, but it certainly does make a fellow warm up, sometimes, to see the way the machine advocates "roast" us folks who still adhere to the old style of brickmaking. In the October Number, "A. Skimmer" gives it to us direct from the shoulder and predicts our total dissolution in a short time. In fact, he is almost as rough on us as Bro. Smith was when he told the members of the last Convention of his trip to Philadelphia and of his surprise at our ignorance in still making brick by the old method when he knew they could be made so much better and cheaper by machines. This is the cry of all machine advocates; also that we are slow and behind the times, and that it is madness for us to still continue making brick by hand and expect to keep up with the procession. It may be madness, but there is a method in our madness. We are all in the business to make money and to make the most money possible from the capital invested.

It takes the very best, strong clay to make machine brick properly and profitably. It is inexpedient to locate a machine upon a lot unless you have clay sufficient for 10 to 15 years. And there are very few such clay lots in Philadelphia, but there are vast quantities of weaker clays (more or less injured by the sand they contain) not adapted to machine brick making that can be so manipulated as to make first-class brick by hand. There are also numerous small clay beds throughout the city that can be worked profitably by hand where it would be folly to locate a machine. Last, but not least, we receive for good hand made brick a price considerable in excess of the best price for the average machine brick. This could not be otherwise, for when a builder wants to erect a neat, clean, smooth wall he must have hand made brick. The machine brick made here will not answer. ZSA

I have seen all the different kinds of machines in use in and about Philadelphia, and many in New York, New Jersey, Ohio, etc. As a result of my observations, I have concluded that cheap machine brick making means reduced wages and more work for the labor. If we have to do this, then we want no machine in ours. We were not brought up that way. We pay our employes the highest wages paid for the same work in Philadelphia, our list averaging for the year 13 cents per M on our total output (9,000,000 or more) more than the Union scale of wages calls for. At the same time we have been reducing the day's work gradually, by doing all the extra work which the gangs usually do and paying for it ourselves. It is the opposite in the machine yards, they trying always to add a little more to the work to be done where the men are foolish enough to put up with it. I am not speaking of a small country yard either where the extra work would be light, but of one that runs 25 gangs and 9 Re-

preses and makes over 7,000,000 common and 2,000,000 repress bricks.

With this I claim that we make better brick with less trouble, dispose of our stock with more ease and make as much money as any other firm in Philadelphia of the same capacity, and more than some firms that I know of who use machinery. Another suspicious fact in connection with cheap machine brick-making is this—the least slackness that we have in trade, causes most of the machine yards to fill up with brick and then comes that cut in prices that the last Convention wrestled with to such little purpose. They do not appear to like the expense attached to piling up rough machine brick. I know it is expensive with any brick but more so with rough machine brick when the kind of labor usually used for that purpose is taken into consideration. Again, if you meet a brick manufacturer and he is crying "poverty, no profits, wages too high, have to make a change," etc., etc., nine times out of ten he has a machine, and it is left to the hand brick makers to try and maintain the wages at a living point for the men.

To sum up, I know this: If A. Skimmer only receives \$5.25 per M and has a profit of \$2.97, the men who make the brick and run the machine get mighty little of the \$2.28 the brick cost, when the fuel, etc. is paid for.

KALI.

Philadelphia, Pa.

Likes Continuous Kilns.

Editor Clay-Worker:

I wish brickmakers would come and see our Continuous Kiln work. They would soon be convinced that no other kiln can be compared with our kilns in regard to hardness of bricks, evenness in burning and cheapness in operation. There are quite a number of brickyards in and around Los Angeles. But our bricks have got the name of being the best ever produced in this country. The bricks I have made this year stand a pressure of 5,000 pounds to the cubic inch. I have tested them as to absorption. My average bricks absorb from 7 to 8.3 per cent. of their weight, but I have lots of bricks in the kiln that don't absorb over 5 per cent. During the rainy season I have made some bricks by hand and repressed them with a Raymond repress. Now I am burning these bricks and by giving them about the best place in the kiln they burn out just as nice and even in color as we can wish for.

Considering that the clay here is inferior compared with the clay in the East, we are making excellent brick, which we burn in Boeckne's Continuous Kilns.

My clay bank being from 10 to 25 feet high has from one to two and a half feet adobe or gumbo on top, the rest is hard, rocky sand with very little stuff similar to clay. Underneath this stuff I have clear, loose, white, in some places, yellow sand. The gumbo is the only binding stuff and I have to use considerable sand with it, to make it work in our Quaker

machines. I am shipping most of the bricks to Los Angeles and we get from \$1.00 to \$1.50 more for them than the regular market price.

Very near all my bricks are sewer bricks and it is the same on the yard of the Sacramento Transportation Co., at Sacramento, Cal. They have two of the same kilns working with a daily capacity so 25,000 each and will put up a third one this fall.

F. H.

Inglewood, Cal.

Believes in Progress.

Editor Clay-Worker:

I frequently get letters by means of and through the Clay-Worker making various inquiries about clay and brick. Mr. J. Dawson, of Sievern, S. C., writes and sends samples of his clay. He says: "I have read your letters in the Clay-Worker and think they are the best I have seen, and therefore now write you for ideas, as asked for, and I assure you it will be highly appreciated and paid for, if account is rendered by mail, with answer. I am going to send my subscription for Clay-Worker and hope to derive much knowledge from same."

I took pleasure in answering Mr. Dawson, of course, without charge. Mr. Dawson sent to me two specimens of clay, one was a very good sample of kaolin. There is a great deal of this valuable kind of clay in South Carolina, and when fairly developed, will prove a great source of wealth to the State. It will not only be valuable as material for the best kind of brick, but will go into all the finest grades of pottery.

Every important industry should have a literature.

I believe the Clay-Worker may be fairly set down as the pioneer in this line of mental work.

It is very gratifying to see that a new era has dawned on the oldest of human arts. The old crude thought and random style of brickmakers is fast giving way to intelligent study. New and improved methods are constantly being brought forward for brickmaking and burning, on principles well founded in theory and science, and though it will take a reasonable time to arrive at the best, or as the recondite say, "ultima thule," yet, healthy progress is now assured. As I have often said, we are soon to have a *clay building age*, instead of a *wood building age*. A most inconsiderate, extravagant, reckless use and destruction of our forests is rapidly going on. No town or city will stop combustible wooden building until it has all been reduced to ashes. A "balloon" frame building, at first, is cheaper than a good brick building, and many foolish people think that a wooden house is healthier than a brick house, and will pay as much or more rent for it, so the food for conflagration and decay multiplies; but all this, will soon change. The best kind of brick, will be made and used in building. The best kind of mortar and cement will be used, and intelligent men will lay the brick, or see that they are laid properly, instead of being half bedded

in poor mortar. If a brick wall be put up in first-rate workman-like manner, within ninety days it will be as solid and strong as stone of the same dimensions. I would suggest a little more name to the Clay-Worker, I would call it "Clay-Worker and Bricklayer." Our bricklayers need a literature. They ought to know the theory and science of their work, and then, no builder should be allowed to employ any but the best workmen, and have the best kind of work. With a few exceptions, outside of bricklaying on U. S. work—done under best officers and master workmen—brick laying and building is illy done.

J. W. CRARY, SR.

New York News.

Editor Clay-Worker:

The principal topic of discussion in the building trades the past month was the series of short strikes on several of the down-town office buildings now going up, notably that of the Union Trust Co., Broadway and Wall Streets, and the Wilks Building, Wall and Broadway. The working men who went out, it seemed, had nothing to complain of against the builders, but their intention was to strike through them at the firm of Peck, Martin & Co., dealers in builders' supplies. The latter house had remained independent of union influences but had had no trouble with its men or with its customers, so that there was actually nothing to provoke the course of the boycotters except that the firm declined to place its business in the hands of the labor union. The following statement sets forth Peck, Martin & Co.'s position:

In answer to inquiries from various persons we wish to state definitely:

First—There is no strike among our employes, and so far as we know there is no dissatisfaction.

Second—Our employes are under no restraint from us as to whether or not they shall be members of any union. We are informed that among them are both union men and non-union men, but do not know in what proportions.

Third—This boycott is laid by trades in no way connected with us. The bricklayers, plasterers, and laborers handle our materials without objection.

Fourth—As a rule we are paying the highest current wages, believing that good wages secure the best and therefore the cheapest work.

Fifth—As to the probable settlement of the matter we have no knowledge, as we have nothing to settle. We are prepared to fulfil all our contracts, and are daily making new contracts for future work.

Oct. 1, 1889. PECK, MARTIN & CO.

At one time it looked as though there might be a union stoppage to building operations in the city on account of this trouble, the trade recognizing the importance of the underlying issue and the manufacturers and wholesale dealers talking of uniting against the boycotters and selling no supplies to those who sided with them, but wiser councils have prevailed and a few days will probably see the matter satisfactorily adjusted.

The threatened glut in the brick market has not transpired and most probably will not, but this is due not at all to the

strike, but rather to the fact that the brick has not come in as fast from the manufacturers as it was expected that it would. Those gentlemen are holding back most sensibly and the result is that the market keeps firm. There have been a number of rainy days and this has also retarded the making of brick somewhat. The demand for brick is lively. Haverstraws are quoted at from \$6 to \$6½, while Up Rivers range from \$5½ to \$5¾. Plans for new buildings are being sent in as lively as ever and if the weather permits the building season this year will be a remarkably long one. Among the new plans is one for a most peculiarly shaped building, so tall and narrow waisted that it looks like a light-house tower. It will be built at No. 25 Pine Street, and will cost \$100,000. The front will be of limestone and pressed brick and the roof will be flat. It will have a frontage of 24 feet and its top will tower 118 feet above the curbstone. The building will be used for offices and it will run back 74 feet from the street.

BRIC-A-BRAC.

As Others See Us.

Editor Clay-Worker:

In answer to the publisher's kind invitation received today, to write something for publication in the Clay-Worker, I have much pleasure in sending the following:

Before proceeding further I would like to give expression to the very great enjoyment and profit with which I peruse said journal, which appears to me to be becoming, if possible, more attractive each issue. I cannot imagine how any clay worker, large or small, experienced or a novice, can afford to be without it, even if the cost were ten times what it is. I consider Mr. Crary's article on burning in the September number alone, probably saved me, on one kiln, more than fifty times the amount of a year's subscription. Of all the publications I receive from England and the States, not one is read with more pleasure than the Clay-Worker. It is refreshing to see the kindly spirit displayed by almost all your contributors, many of whom not only evidently know well what they are writing about, but are also able to clothe their ideas in well chosen and attractive language. There does not seem to be any petty jealousy amongst the craft; but the experienced appear always ready to help, in every way they can, those requiring aid, even though a possible competitor. This is a spirit of which I think a nation may justly be proud, and would be sought for in vain in any other land, with, perhaps, the exception of the old mother country. I may add that I have had occasion to communicate with several of your advertisers, from all of whom, without exception, I have received nothing but attention, courtesy and assistance. I would like to take the liberty of mentioning especially Mr. D. J. C. Arnold, to whom I sent a small order for clay shingle machinery, etc., which was forwarded with the greatest exactness and

promptness, although the amount of invoice exceeded the remittance sent by over \$100, as I had underestimated the prices of the dies ordered, and I was a perfect stranger to him. Also I would like to embrace this opportunity of publicly expressing my thanks to Mr. D. E. McQuaide, of the Climax Fire Brick Co., whose acquaintance I made here some time ago when he visited this place, in the petroleum interest. From him I have received much valuable advice and assistance, including many numbers of the Clay-Worker, to which, entirely of his own accord and at his own expense, he subscribed for me, just at the same time I had asked Mr. Arnold to do so.

You ask if I have a brick yard in operation. Though considered quite a wonderful affair here, I would be ashamed to honor it with the name, in a journal, read by men turning out their 200,000 bricks a day. I have enclosed, a short distance from my dwelling, about 50 by 70 yards adjoining the street which follows the river bank in the suburbs and nicest part of town. At the back of the yard I have an "Old Reliable" outfit, a Raymond Perfection Press with dies for repressing clay shingles, flooring tiles, bricks, etc., drying sheds and pallets for about 12,000 bricks and a kiln which holds about 30,000, all leading towards the point of delivery, as advised by the Clay-Worker. I want to build two more kilns, but am still undecided as to the most suitable plan. I do not want to spend much money till I see how the business turns out. I have had more trouble with burning than anything else. The clay I get from an excavation to the rear of the machine. We are now at the close of the wet season here and I have experienced much inconvenience and loss from the exceedingly heavy rains. The mud bank has been full of water for some time, which started me in search of a supply elsewhere. This I think I have discovered in a very strong clay about 400 yards distant. I have many thousand acres of this clay should it ever prove valuable, as it may do some day, when this country will be inhabited by a race of people capable of developing its untold riches and resources. This clay, mixed with what I have been using, which is, I think, too sandy, will, I expect, give very good results. The clay working business is only an experiment with me at present, but it may develop into quite a business, and I mean to pursue it just as far as it goes. I am much taken with the business and often neglect other things to attend to it. My wife jokingly says she wishes I would give it up, that I can talk of nothing but clays and have to run out every half hour at night when there is a kiln on fire. Sometimes I do not go to bed at all. If not too tiresome I will tell you how I became associated with it.

Being unable to procure some bricks I needed, I determined to try my hand at making them, and, not fancying the usual method employed here for tempering the clay by tramping it out by the feet of mules and men, I spoke to a car-

penter to make me some kind of a mud mill. He told me of an iron mudwing which had been lying idle for some years here. I accordingly called to see it, and not only found the mudwing, but an "Old Reliable" brick machine as good as new, which had been sent here 10 or 12 years ago and had been lying in a shed ever since. And now comes what with your kind assistance, I wish to give publicity to.

This machine had been bought by a Mexican gentleman engaged in making brick, etc., in the old Mexican fashion, a short description of which may prove interesting to some of your readers later on. Circulars and directions, etc., had, of course, accompanied the machine; but these, being in English, could not be read by the owner and were soon lost. The manner in which the machine was attempted to be operated was this: The mudwing was put up in a box made by boarding in four posts on the ground, and, so far as tempering the mud was concerned, which was deposited on the ground through a hole in the mill, did its work most satisfactorily. The mud was then conveyed in handfuls to the machine and put in through the opening at the back; but upon pressure being applied by the lever, it, of course, instead of filling the moulds properly, "spewed" out again where it had gone in. Several attempts were made to remedy this, such as fastening boards to half close the opening, etc., but very soon the machine was abandoned as useless, and quoted to all comers as an example of what swindlers the Americans were, etc. Some Americans who were here from time to time were shown the machine (but without the pug mill) and corroborated the statement, saying the machine had only been made to sell. The moment I saw the machine I said such was not the case, that it was quite impossible a machine so well made, could have been manufactured simply on the chance of selling one here and another there; and at once bought the entire outfit for \$75. This was the price asked and probably double what it could have been bought for had I chosen to beat the price down. Every one laughed at me for having bought the machine, saying it was money thrown away. I then wrote to the makers, "The Tiffin Agricultural Works" and with that courtesy characteristic of all your patrons, by return mail not only had a full descriptive catalogue, but a long letter as well. I am ashamed to say that I have never had the politeness to write thanking them for the same, but I feel I have rendered them a much greater service, as the sequel will show, in proving them, not only an honest, honorable firm, but one which turns out a machine, I should think second to none of its class. It is however, due to my own intelligence to state, that before receipt of their letter, etc., I had discovered how the machine worked and had it up, etc. As soon as ready to commence operations, I invited a few of the leading men in town, including the late owner, to come down and see the first bricks

made. Accordingly at 7 a. m. a number of gentlemen were announced. I had everything in readiness, the mud well soaked, the moulds and sand, etc., all in good order, so I at once took them out to the machine and showed them the empty pug mill, explaining how the clay was tempered by the knives and forced into the machine through the opening by the wings. I then proposed we should go in and breakfast while the men filled the machine, etc., giving orders at the same time, to first "hitch up" two of the mules, so that every shovelful should be well tempered as it went into the machine. After breakfast we again went out. With my own hands I sanded a mould, inserted it in the machine, pulled on the levers, and out came a full mould. I then cut off the surplus mud, scattered a handful of sand over the bricks to prevent them sticking to the pallet, bumped the mould like an old hand of 20 years' experience, and turned out six of as perfect bricks as ever came out of any machine. I then looked up with an air of triumphant satisfaction, and the expression on the countenances of the Mexicans was a picture worth seeing. The inevitable "Caramba!" burst simultaneously from every lip, "*Porque no tenemos nosotros Mexicanos cabazas como los extranjeros*" (Why have not we Mexicans heads like the foreigners?) In the mean time I had all the moulds sanded, and turned out mould after mould of beautiful bricks, almost as fast as the men could remove the pallets. "Caramba! La maquina trabaja perfectamente bien." (Wonderful! The machine works perfectly). I then accompanied my guests to the gate where I bid them "Adios," and could hear them for some time afterwards, in animated discussion far up the street.

I had intended, in addition to a short description of Mexican clay working, to give your readers some idea of the prices of labor, fuel, etc., and the value of the product here, also of some of the difficulties which beset the business, and indeed any undertaking in Mexico; but I am ashamed of the unreasonable length at which I have already trespassed upon your valuable space. I will therefore, with your permission, reserve further comment for a future occasion.

Tuxpan, Mexico. R. M. GREER.

Why Some Do Not Succeed In Making Dry Press Brick.

Editor Clay Worker:

There are some that do not succeed in the manufacture of dry press brick and some do succeed. Let us inquire into the causes of the want of success.

1st. They do not prepare their clay properly.

2nd. They do not care for them properly after they leave the press until they are set in the kiln.

PREPARATION OF THE CLAY.

We take the clay from the bank to dry yard and then let the wind, sun and rain dissolve it. After the weathering we pulverize it with a disk pulverizer

and when the clay is dry we cart it into the store shed where it is allowed to remain long enough for the chemical elements to combine throughout the clay, or mullied as we call it. Then it will be in good condition for the pulverizer and press.

We find in our experience that clay must be tempered as carefully for dry press brick as for soft or stiff mud brick to get the best results.

CARE OF BRICK AFTER LEAVING THE PRESS.

The brick are taken from the press to dry floor and dried. They are not so liable to damage in watersmoking if they are dried on a dry floor. If you have no dry floor put them on pallets and set them in racks in the shade or hack them in hacks ten to fourteen high and let them dry out thoroughly, for there will be plenty of moisture in any dry press brick. Afterwards, set in kiln and burn as any dry press brick is burned, first using especial care in the watersmoking.

Our brick compare favorably with any brick made by the dry press process in this country. They are hard as steel, ring like a bell, and deep red in color. My method of burning is practically the same as that of J. W. Cray, Sr., who has written some very valuable articles for the Clay-Worker, and the Clay-Worker should be in the hands of every brick-maker. "Long may it wave."

J. D. PRATT.

A Strange Case.

Editor Clay-Worker:

Our company has a mountain of debris hoisted from its coal mines consisting of fire clay and soapstone or shale mixed. This product when left in large heaps, fires by spontaneous combustion and becomes a red color and dry almost like a cement; left in smaller piles, it rots or slacks down and becomes a homogeneous mass of clay and does not fire. The soapstone, especially, slacks to a smooth, soft, mealy clay apparently suitable for the dry press.

I should like to hear from your correspondents as to what may be done with the mountain of burned stuff in making paving brick or some other clay product and also as to the feasibility of making a dry pressed brick out of the soapstone. The experience of parties who have worked such clay will be very welcome.

E. L. MONSER.

CHICAGO WILL BE THERE.

Our Chicago friends are making ready to attend the meeting of the National Association at Philadelphia. They have always added much to the interest of these annual gatherings. They have a snap and ring of enterprise that will locate them even in the dark, and which makes them conspicuous in the light. We have at times admired their reticence, but we note the fact that when they want the floor they generally get it. If there are great undertakings to be engaged in, they are equal to the task. Come on, Chicago, one hundred strong, or more.

BRICK YARD SKETCHES.

C. P. Merwin's Model Works at Berlin, Connecticut.

One minute's walk from the railway station at Berlin, Conn., brings us to the now widely known brick yards of our esteemed friend, Chas. P. Merwin, Recording Secretary of the National Brick Manufacturers' Association. Those who know Mr. Merwin personally need not be told that everything about the plant is in good working order, for he will not tolerate anything that is not systematic. An idea of the extent and character of the plant may be obtained from the accompanying illustration which does not do the works justice, however.

Mr. Merwin owns three hundred acres of clay land on which the factory is located, thus insuring an ample supply of excellent clay for several generations to come, and it is all easily accessible. The office and yard are contiguous to the track of the Hartford railroad, so that the loading of cars is most convenient, while material for the kiln fires can be unloaded with equal facility and proximity. Mr. Merwin is fortunate, moreover, in having no less than six railroad fronts to his clay fields, an advantage easily discernible. The brick manufactured by Mr. Merwin are unexcelled in quality and command a wide market all over the

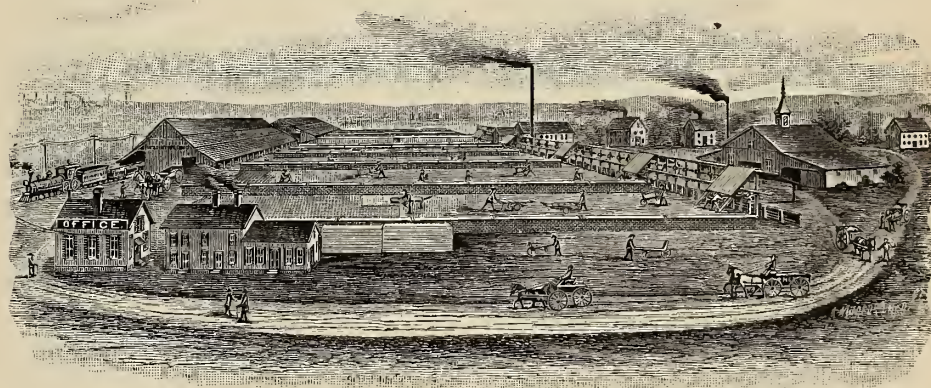
dy means of electricity, thereby avoiding all danger. The capacity of the works is 160,000 brick per day.

The most recent addition to the plant is a new Penfield upright stock brick machine with pug mill attached. It is a very heavy machine being built entirely of iron and steel, and turns out a fine grade of stock brick. Mr. Merwin is much pleased with it and will put in more of them the coming season. He is also investigating artificial dryers with a view of adopting that system instead of the rack and pallet which he now uses. Mr. Merwin's success is gratifying, though no surprise to those who know him, for his great energy and intelligence would brook nothing less.

Mr. Merwin is a most ardent advocate and supporter of the National Brick Manufacturers' Association and has recently written hundreds of personal letters to the brickmakers throughout New England telling of the coming convention in Philadelphia and urging all to come and take part in the work. The result we trust will be an attendance from that section that will gladden the heart of our worthy Recording Secretary. May he live long and prosper.

IN AND ABOUT PHILADELPHIA.

After a long but pleasant journey over the picturesque Chesapeake and Ohio



C. P. MERWIN'S BRICK YARD, AT BERLIN, CONN.

State of Connecticut, Southern Massachusetts and Rhode Island. He has a large demand for his brick from the leading builders of the city of Providence and of many other places. While the quality of the clay is unsurpassed, Mr. Merwin spares no pains or means to secure the best possible results, as is seen in the use of the latest and most approved appliances, machines and machinery. Six machines were at work yesterday when we visited the premises. This is an age of electricity, dynamite, smokeless powder, etc., and Mr. Merwin, to expedite the loosening or breaking up of the clay for the carts, employs dynamite, which does all that is required, loosening great masses and breaking them in fragments ready for the easy application of the pick and shovel; the dynamite magazine being about 3,000 feet away, while the explosion of the dynamite is accomplished

R. R. we recently arrived at Philadelphia, and to our delight found waiting a note from friend Geo. W. Sharer, saying that Mr. J. A. Blaffer, of New Orleans, was also a visitor in the city of brotherly love and requesting that on the following day we together make a trip to the brick yards. It is needless to say that the invitation was accepted and that a pleasant day of sight seeing among the Quaker brickmakers resulted. We had not met friend Blaffer since the first annual convention of the N. B. M. A. at Cincinnati in 1886, where he was honored with the first vice presidency of that body, an office he filled to perfection, winning the admiration of all who then gained the title of "Charter Member," a distinction that will be held in higher esteem as the good work then inaugurated continues, and is better appreciated by the craftsmen generally. Before visiting the brick

yards we were treated to a fine drive through Fairmount Park by Mr. Murell Dobbins, who, like all good Quakers, takes special pleasure in showing visitors the beauties of that resort while holding the reins on a splendid team of thoroughbreds, as fleet, almost, as the wind. The Quaker brethren *may* be slow but they don't drive that way, at least friend Dobbins does not.

A TIDY FACTORY.

The first brick yard visited was that of Siner Bros., near Frankfort Junction, on the Pennsylvania Railroad, where we were cordially welcomed by both members of the firm, who, it seems, have a habit of looking closely to their business affairs. Brother Blaffer remarked that there was an air of order and industry about the works that bespoke of good management. From the engine room through to the sorting sheds everything was tidy (if such an expression may be used in connection with a brick yard) and in place. The clay is carted to a platform above a Newell pulverizer which quickly grinds up the clods and lumps leaving the clay in good condition for the pug mill to which it is conveyed on a belt and by it in turn fed into a Martin machine. The molds are sanded by a Newton sander. From machine the brick are dumped on metal pallets placed on a revolving mold table and then piled on iron cars, holding 420 brick, and are next pushed into a Sharer tunnel drier, cut of which may be seen on page 290, which Mr. Siner commends very highly. It is a ten tunnel drier, each tunnel is 100 feet long holding fourteen cars. From the drier the brick go to the kilns (Sharer's patent) which hold 200,000 or more each. A new kiln of Mr. Siner's designing was in course of construction at the time of our visit which they believe will be an improvement on the old ones. At any rate it will prove a durable one for it is built regardless of expense, the walls being exceptionally heavy and lined inside eight or ten high with fire brick.

The kiln will probably be completed and fired before the coming convention when the brethren, who will be invited to visit the yard, can then judge of its merits for themselves.

One feature of this yard worth mentioning is a clay storage shed near the machine where surplus clay is dumped from time to time, thus providing a supply that may be drawn on when bad weather prevents them from hauling from the bank.

They employ 21 hands on this yard and make 28,500 brick a day. They also have an old style outdoor yard in the same vicinity where they make both by machine and by hand and burn in old style Dutch kilns.

Messrs. Siner Bros., may their shadows never grow less, are evidently prospering, as industrious brickmakers should.

The next yard inspected was that of

THE JARDEN BRICK CO.,

which we visited in company with Mr.

Seymour, the affable representative of Messrs. I. & M. Wolff & Coleman, of Chicago, to whom we are indebted for various favors. The Jarden Brick Co. is a new stock company recently organized with a capital of \$1,000,000, a goodly portion of which they are investing in new machinery, driers and other modern appliances. They succeed to the business of L. E. Jarden & Co., which is among the oldest firms of brick manufacturers in Philadelphia, the business having originally been established by the late Jacob Jarden in 1836.

The new company is composed of Mr. H. C. Webster, Wm. L. Elkins, P. A. B. Widener, Chas. E. Yerkes and W. L. Gregg.

At the time of our visit the yard was in a chaotic condition owing to the reconstruction of the plant which is being enlarged on an extensive and elaborate scale. When completed the works will really be two plants in one—the old, a soft clay yard, and the new, a dry clay factory on the Gregg system. On the former they are building an Iron Clay Dryer, under the direction of Messrs. I. & M. Wolff & Coleman, which will make them more independent of the weather and insure a more regular and uniform output.

We were much impressed by the thorough manner in which the improvements are being made. Everything is thoroughly well done. The drying tunnels being whitewashed inside and painted outside, making a neat and attractive plant, in striking contrast with what we usually see about a brick yard.

They run two Martin machines with crusher and pug mills attached and will put in three more. They also run several hand gangs for whom the clay is tempered with the old style tempering wheels. They have been making about twenty million brick a year and intend to increase their capacity to sixty million.

THE DRY PRESS PLANT,

we had been informed before reaching the yard, was not open to visitors, but this we found was not the case, but on the contrary we were very kindly shown all over the place by Mr. J. L. Hill, the Mechanical Engineer, under whose supervision the works are being constructed and put in operation. The Gregg system of machinery is the one adopted. They were running one double and one single machine, making 25,000 and 12,000 brick a day respectively. The clay is carted to the sheds, a little distance from the machines, is first passed through a crusher, which reduces the large lumps, and is then conveyed to a Gregg pulverizer above the machine, which reduces it to a fine powder, when it is fed down into the machines, which are of the semi-dry order. From the machine they are placed on cars of peculiar construction and conveyed to a tunnel drier, thence to the kilns.

The finer grades of ornamental brick are made in the same fashion, but on hand or screw presses similar to the one illustrated on page 340. The clay for

each brick is weighed out by a boy who puts just the exact amount in each mold. It is then first carefully pressed into the mold by hand, after which the upper part of the mold or die is forced down upon it by screw pressure. The brick thus made are beautiful in form and finish and there is no limit to the designs that may be produced.

These plants will be in operation during the convention, when the delegates will be invited to visit them and see for themselves, just how the work is done.

The works are under the management of Mr. H. C. Webster, who is also president of the company, and a most agreeable gentleman. If he is as successful in making brick as in entertaining his friends and visitors the Jarden Brick Company has a very bright future indeed.

On our return journey we stopped at

MR. MURRELL DOBBINS' YARD,

but unfortunately missed him, he being at another of his yards, of which he has four, one at Long Lane and Mifflin Streets, where he uses a Chambers' "B" machine, and turns out about eight millions during the season. Another yard at 23rd and Passyunk Avenue, where he uses a Martin machine for common, making stretchers and paving bricks by hand and repress a portion of the Martin machine brick. The capacity of this yard is about seven millions and having a Sharer drier here, he can run nearly all the year, if trade demands it. This yard will probably be running during the convention and all who wish to visit it will be given an opportunity to do so. He has one yard at Kinkora, N. J., on the line of the Pennsylvania R. R. and Delaware River, about twenty-five miles above Philadelphia, where nothing is made but rough brick, using a Chambers' machine and tunnel driers. The output of this yard is probably seven millions a year.

His other yard, at Florence, N. J., is on the Delaware River about a mile below Kinkora. He uses there a Chambers' machine and makes four millions. Here is some of the finest clay in this section suitable for the manufacture of anything that can be made of clay. Under the clay bed there is some very good kaolin, which Mr. Dobbins intends to put on the market soon.

He has his own schooners and scows, built purposely for carrying brick, and can deliver from the Jersey yards anywhere along the river front cheaper than the yards in the city.

In addition to the four brick yards having a combined capacity of twenty-six millions per annum, Mr. Dobbins has a stock farm of 300 acres well stocked with horses, sheep and cattle, which one would think was enough to keep him out of mischief, and we think it does, at any rate we have heard of no mischief of his doing, but we have heard Mr. Dobbins spoken of as the most generous host in all Philadelphia, and though that is indeed high praise, we, from our own experience, have no reason to doubt it.

THOS. B. MCAVOY'S YARDS.

There is one conspicuous figure among the craftsmen in the city of Brotherly Love which cannot be overlooked. Per force of circumstances our friend, McAvoy, looks down upon his associates who, in turn, look up to him. Yet it may be said of truth, that he is every inch a man. Dame Nature has endowed him not only with great physical strength, but as well with a kindly, generous nature that makes him a general favorite among his fellows. From this, the reader will know that the visit with him to his, and his neighbor's yards was a pleasant trip, made still more pleasant by the company of Recording Secretary, Merwin. Mr. McAvoy's yards—which he has placed in charge of his sons, and wisely, too, we judge, for they are thorough-going and painstaking brickmakers who can give many older heads pointers—are hand yards. We visited but one and found them getting things in readiness to close down for the season. A noticeable, and to us a new, departure, was the method of driving the tempering wheels. They use steam power, but where it is applied is a curiosity and puzzle to the visitor. No gearing or shafting is visible, yet round and round go the wheels driven, it seems, by magic power. The mystery(?) was quickly explained by Mr. McAvoy telling of an underground tunnel, four feet six inches deep, and four feet wide, built especially for the purpose, through which the shafting, 150 feet long, is carried. There are three pits, each holding clay for 20,000 brick which are tempered by wheels connecting with this shaft. The system is very satisfactory and has proven much better and cheaper than horsepower, formerly used. The brick are made in iron molds, one at a time, and dumped on the yard. When dry, they are burned in the old style Dutch kilns, with coal. Both hard and soft coal is used, the former costing \$3.00, and the latter \$5.00, a ton. About one-fourth of their entire output is repressed by hand, and burned with the common brick. A kiln was being emptied when we were at the yard. The brick were very good and hard up to within a course or two of the top. The green brick measure $8\frac{1}{2} \times 4\frac{1}{2} \times 2\frac{1}{2}$, and when burned, $8\frac{3}{4} \times 4\frac{1}{4} \times 3$. In the shed were piled a fine lot of fronts and stretchers that for color and form, are hard to beat.

From Mr. McAvoy's, we were driven across the city to

FLOOD BROTHERS YARD,

at 2747 Frankfort Ave., where we found that prince of good fellows, T. H. Flood, and, to us, a more familiar scene, this being a machine yard with Sharer's patent driers and kilns. The clay is hauled in carts to a platform, beneath which is a Penfield Crusher, from which a belt carries it to the pug mill which, in turn, feeds it into a Carnell soft clay machine, which makes 25 M a day, and could make more. From the machine, the brick are placed on iron pallets, and on iron cars are taken to the drier, which has ten tunnels, 120 feet long. The

brick come from the tunnel bone dry, ready for the kiln. Mr. Flood spoke very favorably of the drier and kilns both, and also of the machine, which he considers A No. 1.

After looking around the yard hurriedly, we "surrounded" Mr. Flood and persuaded him to join us, and the party then became one bent on pleasure alone, with no heed or care for bricks that are made of clay.

We visited several other yards of which we wish to speak, but as we write, the voice of the compo. rings in our ears, crying: "Hold, enough!" and we lay down the pencil and defer further comment on the trip, which was in every respect a most pleasant one, till the following (December) Clay-Worker.

THE BENEFITS OF ASSOCIATION.

A few Reasons why Brickmakers should Attend the coming National Convention.

There are numberless reasons why a broadly extended trade like that of brick-making should be thoroughly organized, and there are none why they should not be. In this day of the railroad and telegraph, of rapid transportation and instantaneous dissemination of intelligence, of large capitalization of industry and what is more than all, the concentration of general interests, a trade is neglecting its greatest opportunities when it fails to be broadly and thoroughly organized. There is the social phase of its meetings, bringing about new and often lasting friendships. There are the men whose callings are similar, each with some peculiarity in his own method to impart, or some experience in his own business to be avoided or followed. There will be the place to discuss improvements or exchange experiences or discuss reforms. The time has passed when a man or even a trade, can build a fence about himself or his trade interests, and depend upon his own resources, or the little local trade that might happen to be about him. There is now no locality in that restricted sense. Every brickmaker is interested in the doings of other craftsmen and is tied up with them for good or ill. But taking the broadest view of this process of organization going on throughout the civilized world and leaving out any mere question of commercial advantages that may or may not be practical, there is one that is comprised in the mere bringing together of the sentiment and intelligence of a large and widely extended industry.

It is not an experiment, but it is a fact, that this bringing together of people who have a common interest, has largely been instrumental in raising the American people as a whole, beyond and higher than any other people. It has done this because it brings all together where the brightest minds fertilize the whole. There is not a single individual who will attend these meetings but will receive some educational benefit from each member and from the whole, and the brightest minds are sure to impart to the others some degree of their fertility and in re-

turn, receive it from the whole. No worker in clay can afford to miss this meeting, nor can the meeting afford to miss the man. The Association will be whatever its individuals choose to make it, and it will reflect back all that the individuals who compose it give to it.

CINCINNATI TO PHILADELPHIA.

Our honored ex-president, W. A. Eudaly, who has from the first convention held in Cincinnati in 1886, been among the most enthusiastic supporters of the National Brick Manufacturers' Association, is organizing an excursion party to the coming annual meeting in Philadelphia. His idea is to have those in the vicinity of Cincinnati, who will attend the convention, form a party and charter one or more Pullman sleepers for the trip. The plan is a good one and should meet with favor from all who can make Cincinnati their starting point. Craftsmen from points West or South can buy tickets via Cincinnati and join Mr. Eudaly's party there.

It is now proposed to leave Cincinnati Sunday, December 8th, at 6:30 P. M., by the C. & O., F. F. V. Vestibule Limited, one of the finest through trains in America, arriving in Philadelphia, Monday evening at 6:15.

A round trip rate of one and one-third fare has been made by this route. By chartering a sleeper that expense will be lessened.

Those who know our genial ex-president need not be told that all who go under his leadership will have an enjoyable trip. There will be a strong, deep current of good fellowship that will be liable at times to bubble into hilarity and make the journey a very pleasant one. We have traveled with him and speak from experience.

Those who can go that way should write Mr. W. A. Eudaly, 64 Johnston Building, Cincinnati, for exact information. He requests that applications for berths in sleeper be made on or before December 5th, in order that ample accommodations may be provided for all.

THE BARRINGTON BRICK CO.

A correspondent whom we supposed to be reliable, sent for publication in the October issue of the Clay-Worker, a very complimentary notice of the Barrington Brick Co., of Barrington, R. I. The last few days have developed some facts that are not creditable to the managers of this Company, to say the least. The scheme, so far as can be seen at this writing, was set up to induce conservative capitalists to invest their money, and intrust the management to men who have proved themselves unworthy of the confidence reposed in them. A committee of honorable men have been appointed to investigate matters, and it is believed by some that the Company will be found to be thirty thousand dollars in debt and the main plant on leased land.



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14 & 16 S. Tenn. St., Indianapolis, Ind.

THANKSGIVING--RETROSPECT.

The year now drawing to a close has been one of signal success in many lines of business. The brickmaking industry throughout the country has been prosperous, excepting localities where the continuous rains have seriously effected the business. Prices have been quite well maintained, excepting only a few localities. Brick is being more generally recognized as the best and cheapest material. In addition much more attention is being given to the use of ornamental brick and terra cotta. Brick for street paving is exciting much attention, and bids fair to supplant many other kinds of material that have been used for the purpose. The manufacturers of clay working machinery have had a prosperous trade. There has been a general advance in the added improvements to increase the efficiency and durability of much of this class of machinery. In looking over the list of our advertising patrons and the large line of clay working machinery illustrated we feel especially proud of the exhibit, and the advance that has been made in the past half decade of years. It is really marvelous.

As publishers of a clay working journal we have every reason to be thankful for the success we have achieved the past year. We have made a large and healthful growth. Our subscription list has increased beyond our most sanguine expectations. We appreciate fully, the many favors poured out upon us without

measure, by our host of friends and readers throughout the country.

Let us, then, one and all, when the annual feast day comes again, go to the Thanksgiving table and partake of the turkey and other good things so plentiful with hearts overflowing for the bounties of the year.

A HEALTHY GROWTH.

"Tall oaks from little acorns grow," but they do not grow to their full size in a day nor in a month, but it is the work of years. As the roots reach out and down into the earth, taking fast hold upon it, the branches above extend, enlarge and become stronger. The development goes on year after year, laying on growth upon growth. The crowning foliage pushes itself higher and higher up into the blue of the heavens. The winds blow but to make it stronger, the sun shines and deepens the living green, the balmy air brings food and life, and the rain waters it. The years go by and the small, budding acorn becomes the majestic oak, but the development of roots and branches has been gradual. The annual growths may have been large but they were year by year.

So it is with successful periodical publications; it is the work of years. They must be deep rooted to support the body and branches. They must prove their strength and sturdiness by actual tests. Each day in the added years of their existence may bring larger growth if the conditions are favorable, but the enlargement must be healthy and not abnormal. The leading publications of the age have had this same gradual growth. Their patrons have learned to welcome their coming as they welcome the face of a friend; to rely upon their columns for information, to trust their statements and to follow their lead in many things.

There is no such thing as vaulting into the saddle of public confidence and support at one bound. It takes time, labor, experience and acquaintance; there must be a mutual confidence growing with the growth, and strengthening with the strength. It is not to be expected that a publication (it matters not what it claims) will have a large share of public confidence until it merits it.

Publications have characters the same as individuals and good characters are the result of "being of ten tried and never denied" in the testing. Characters are not necessarily what is claimed to be, but what they are found to be in the run of years. Nothing is truer than this

in determining the merits of a publication.

STRAY CONVENTION NOTES.

No city in the Union offers more of interest to brickmakers than Philadelphia. It is the nestor of American brickmaking and every craftsman in the land who can, should take in the Convention. It will pay. Try it.

The Philadelphia brickmakers are thoroughly aroused as to the importance of the Convention work. Nothing that they can do to make the meeting a success, will be left undone. The right hand of fellowship, and a most hearty welcome will be extended to every visitor. There is a love feast in store for all. Don't miss it.

Brick manufacturers will find it to their advantage, in dollars and cents, to bring their foremen and superintendents with them to the Convention. The information gained will prove a paying investment. Come yourself, and bring your wide-awake, intelligent superintendent with you. You will be the gainer in the end.

Every craftsman who is meeting with difficulties in any of the various details of the business should come to the Convention and let his tribulations be known, and the chances are nine to one that he will receive information that will enable him to overcome the trouble. In this connection, we wish to call especial attention to the QUESTION BOX. If properly used, it will prove a rich source of discussion on matters of much importance that otherwise may be entirely overlooked. Use your thinker and your pencil together, fellow craftsmen. Come to the Convention for a purpose. Know what you want to know; ask for what you want and the chances are, you will receive it. Don't forget the Question Box.

KEEP YOUR EYES ON US.

We are in receipt of some very interesting and instructive letters from both new and old contributors that we are unable to get into this issue, which will be given to our readers in the following one. In the preceding number we stated that this issue would be an exceptionally valuable one. Look through it and you will admit that it is all of that.

We believe that it contains more original, practical and interesting matter on brickmaking and kindred interests than was ever before bound between two covers of a periodical.

Look out for the Dec'r Clay-Worker!

EDITORIAL NOTES and CLIPPINGS.

A pottery will be erected at Ottay, San Diego, Cal.

The Pains (Mich.) Brick Co. has been organized.

It is proposed to start a pottery near Addie, N. C.

B. P. Eagan is making paving brick at Omaha, Neb.

S. D. Lloyd will build a brick yard at Beattysville, Ky.

W. H. Clark has started a brick yard near Corning, Ark.

W. G. McDowell has started a brick yard at Lexington, Ky.

Alton, Ill., wants a paving brick company established there.

Henry Flood, Stutgart, Ark., has purchased brick machinery.

Owen Hatten, an old brickmaker of Philadelphia, died Oct. 20th last.

H. V. Hardwick, of Almon, Ga., may build a brick yard in that vicinity.

Don't forget to mention the Clay-Worker when writing to advertisers.

The Capital Pressed Brick & Paving Co., Topeka, Kan., is now under way.

The Olympia (Wash.) Brick & Tile Co., has been organized. Capital, \$20,000.

Rufus Tibbetts, a well-known brickmaker of Portland, Me., died Oct. 20th.

The Fenn Brick Co., Leavenworth, Kan., has been chartered. Capital stock, \$40,000.

Az. England, of Havanna, Ill., proposes to put an additional brick machine in his yard.

Robt. Logan & Son will start a new brick yard at McKeesport, near Pittsburgh, Pa.

Evansville (Ind.) Pressed Brick Co., will put in additional brickmaking machinery.

It is claimed that a large and valuable bank of clay has been located near Trenton, Ga.

Brick works are to be erected at Vicksburg, Miss., by the L. N. O. & T. R. R., of Memphis.

P. Hansen, of Deadwood, S. Dak., will purchase a brick machine and start a small yard.

The Denver (Col.) Sewer Pipe & Clay Co. has been incorporated, by James H. Green and others.

Chauncey Williams, Troy, N. Y., recently, successfully burned a kiln containing 800,000 brick.

Lovett Bros., McKeesport, Pa., are preparing to run their brick yard at Elrods throughout the winter.

Messrs. Perot, Collier & Call have purchased a brick yard at Tacoma, Wash., and will add machinery, etc.

Jno. C. Hodges, Jr., and others, of Denver, Col., have organized the Globe Brick Co., with \$200,000 capital.

T. A. Bingham, and others, have organized the Meridian Brick Works at Tacoma, Wash. Capital \$45,000.

The Old Bridge (N. J.) Tile Co. has been organized by Sherman Van Ness and others. Capital \$12,000. Will make tile.

Midland Brick Co., Chicago, Ill., has been incorporated by J. A. Sleeper, Julius Starrett and E. W. Ehrlich. Capital, \$200,000.

The Puget Sound Brick, Tile & Terra Cotta Co., of Tacoma, Wash., has been organized. Capital, \$100,000. W. C. Hill is Superintendent.

A Beatrice (Neb.) syndicate recently purchased thirty acres of clay land near Table Rock, Neb., of C. H. Norris, and will build a brick and tile factory.

The Kissel Fire Brick Co., Rochester, N. H., have imported a brick press from England. Pity they couldn't get a better one on this side of the water.

The Portable Brick Drier Company, Chicago, has been incorporated by David O. Shea, Edmund Christie and Martin Carroll. Capital \$40,000. They propose to manufacture brick driers and machinery.

Winslow & Co., of Portland, Maine, have ordered Automatic Presses of C. W. Raymond & Co. They are extensive manufacturers of fire brick, having, probably, the largest establishment in the East.

The demand for the Detachable Chain Belting and Conveying Machinery, manufactured by the Jeffrey Mfg. Co., of Columbus, Ohio, is good, judging from the many orders which this company has on their order books.

Jonathan Creager's Sons have completed and will soon show cuts of an improved combination Chilled Roll Disintegrator and Differential Smooth Roll Crusher especially adapted to preparing clay for dry and semi-dry brick making.

Nathan Stedman, of Aurora, Ind., manufacturer of the well known "Stedman" Pulverizer, writes: "Business is very good with us. Our Improved Disintegrator is gaining in favor rapidly. We owe a great portion of our orders to our advertisement in the Clay-Worker." Moral: It pays to advertise—in the Clay-Worker.

The Frey-Sheckler Co., of Bucyrus, O., report that their trade keeps up as brisk as ever. The late improvements on the large Double Power Repress proved a complete success. A smaller size is now being constructed, somewhat on the same plan. A new, very heavy auger machine, with five-inch steel shaft, steel knives in steel socket, with open pug mill combined is also being made. We also learn that they have made additional improvements on their buildings and are putting in new machinery.

Messrs. C. W. Raymond & Co. of Dayton, O., took a large subcontract on the Lick Run Sewer, at Cincinnati, O., of furnishing 24 of their Dumping Cars and 1,200 feet of Portable Track. The entire shipment will occupy about five ordinary freight cars and will be made complete on Nov. 5th. The Lick Run Sewer is

famous in that it is said to be the largest in the world.

Fletcher & Thomas, Indianapolis, Ind., report the brick trade of this city as never better at this time of year, with prices advanced to a satisfactory figure. They report their prospects for the coming year in the brick machine line, as very flattering. The sales of the New Improved Quaker the past season were very large, and the entire satisfaction given was such that they look for double the business in 1890.

C. & A. Potts & Co. report trade as being universally good the past month, the following being a part of the month's shipments: Eight Disintegrators to one firm at Portland, Oregon; one Combined Pug Mill and Disintegrator to Spokane Falls, W. T.; one Disintegrator, Elevator, etc., to Scottsdale, Pa.; one Combined Pug Mill and Disintegrator to Lock No. 4, Pa.; four Mould Sanders to one firm of brick machine manufacturers. They have now booked orders for two Horizontal Brick Machines, Disintegrators, Clay Pullers and Elevators for one firm in Wisconsin. One complete outfit, including Horizontal Stock Brick Machine, Disintegrators, Elevators, Sander and 40 h.p. Engine and Boiler for Pennsylvania.

THE CONTINENTAL HOTEL.

Which will be the home of most of the delegates to the Brickmakers' Convention during their stay in Philadelphia, is one of the best known hotels in America. The selection of the Continental is a credit to the Hotel Committee for it is conveniently located, being but a short distance from the Convention Hall. It is situated in the center of the city convenient for shopping, theatres and general business.

Although within easy walking distance of the railroad stations, an omnibus meets all trains at the Broad Street Station and carries passengers to and from the hotel at the nominal charge of ten cents. Those who wish may take a Chestnut street car, which passes the door of the hotel.

The Continental contains over four hundred sleeping rooms, which are neat and cosy, while the spacious parlors, dining rooms and halls are unsurpassed.

The service in the dining rooms and throughout the hotel is most excellent. Every modern convenience is provided, including fire escapes, and a supply of water from their own artesian well 240 feet deep.

Those who will be accompanied by ladies, especially, should notify the hotel of their coming, and order rooms reserved in order to obtain desirable locations. This will cost nothing but a two-cent stamp and the trouble of writing a letter, so do not neglect it. When registering at the Continental inform the clerk that you are a delegate to the N. B. M. A., in order that there may be no misunderstanding.

Go to the Convention and stop at the Continental.

THE F. F. V. TO PHILADELPHIA.

The finest train between the West and the East, is the F. F. V. (Fast Flying Virginian), over the Chesapeake and Ohio Route, which runs to Washington, Baltimore, Philadelphia and New York, leaving Cincinnati at 6:30 P.M. and reaching Philadelphia at 6:15, the next evening. These facts are of interest to those who will attend the coming Annual Convention of the National Brick Manufacturers' Association, which meets in Philadelphia, December 10. The train leaves the Union Depot, Cincinnati, upon the arrival of trains from Indianapolis, St. Louis and the West. 234

This train has won fame for the new management on the C. & O. It is an elegantly and luxuriously appointed limited train, vestibuled from end to end, heated with steam from the engine and lighted with electricity. It runs through solid to New York, and is the only vestibuled limited with through dining car between Cincinnati and the East. The dining car is under the management of the Pullman Company and is equipped with every appointment of a first-class hotel, the menu comprising every delicacy. Meals are served *table d'hôte* at the uniform price of \$1.00

The C. & O. Route to Philadelphia is the most picturesque and beautiful in North America. Its charms are as varied as they are striking: The Ohio River for 160 miles, then the wild and roaring New River in its rock-ribbed canons, its banks lined with blazing coke ovens, then the towering Alleghenies and the soft Blue Ridge. All these and many other features engage the traveler's attention.

The rate of fare to the Convention will be one and one-third fare for the round

trip. For information as to rates, etc., apply to agents of connecting lines, or address

H. W. FULLER,
Gen'l Pass. Agent, Cincinnati, O.

Our "English Letter" did not reach us in time to enable us to have the engraving made, showing the plan of continuous kiln to which reference was made in the October issue, page 241. It will appear, however, in the following number and will, no doubt, prove very interesting to many of our readers.

Our readers will pardon us, we feel sure, for having so much to say of Philadelphia and Philadelphia interests in this issue. In view of the coming meeting there, we think these matters of special interest to the craft just at this time.

Willis E. Everett, geologist and mining expert, of Tacoma, Wash., is authority for the statement that within a few hours ride from that city are large beds of various kinds of clay, including fire clay, slip glaze clay, porcelain and pipe clay.

OUR 1889 CATALOGUE

Is in Printer's hands. Parties desirous of obtaining same will please forward their address at once

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Link-Belt Machinery Co.,

CHICAGO & MINNEAPOLIS,

Link-Belt Engineering Co.,

NICETOWN, PHILADELPHIA, PA., &

49 DEY ST., NEW YORK, N. Y.

[Mention the Clay-Worker].

CRUDE PETROLEUM AIR BLAST FIRES

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THE CLAY-WORKER

VOL. XII.

INDIANAPOLIS, IND., DECEMBER, 1889.

No. 6

Written for the Clay Worker.

EXAMPLES OF AMERICAN BRICK AND TERRA COTTA WORK.

No. 22.

RAILWAY STATION, TERRA COTTA, ILL.

Among the oddest, and yet one of the most attractive structures we have seen in our travels of late years, is the subject of this sketch. The idea of adapting drain tile to architectural purposes is a novel one, and has probably occurred to few, if any, of our readers, who are familiar with that homely, though useful clay product. The accompanying sketch will show, however, that such use may be made of tile, and that, too, with pleasing effect. The plan originated in the prolific brain of our good friend, Wm. D. Gates, President of the American Terra Cotta and Ceramic Co., whose works are but a short distance from the station, which is located on the Chicago & Northwestern Railway, some thirty miles from Chicago.

The building is 18x32 feet, with a projection in front of four feet. It is divided into three rooms, a baggage room 9x16, a passenger room 13x16, and an office 8x20 feet. It was built soon after the establishment of the factory, and the material was such as could be turned out quickly. The building blocks were made on a tile machine, using a seven-inch square die, making 7x7x10 inches, with a center partition, so there are in the wall two dead air spaces of two and a half inches each, and three upright

partitions. The plaster was put directly on the inside surface. Fearing that the plaster would not adhere to the blocks they corrugated them on one side. This, they afterwards found was not necessary, as, with their clay, the plaster takes firm hold and sticks fast.

The base about the building was built of brick, which it was thought would better stand the rough usage, that might, it was feared, break the blocks.

For architectural effect, the front is ornamented with two columns of drain tile, into which the walls run and are anchored. The bases of the columns are

gles measure the thickness of wall one way, thus giving the actual material. The section of a pilaster is measured as the sum of its face and returns multiplied by its projection from the wall. Measure openings four feet wide or less as though the walls were unbroken.—*Er.*

KNOW THE WORTH OF THINGS.

There is quite a difference in the quality of goods that one may have. A tile manufacturer has a good clay, good machinery and kilns. He makes an excellent article. The tile are straight, round or perfect in form, smooth at the ends, and uniformly well burned, and handled with care throughout from the press to the storing yard. They are worth more than rough, warped and unevenly burned tile. When a tile manufacturer has a good article of tile he ought to ask the worth of it. The manufacturer that has a poor article of tile is very likely to cut the price. The purchaser of tile should never



RAILWAY STATION, TERRA COTTA, ILL.

larger, projecting, to correspond with the brick wall or base. The columns are made of three-inch drain tile, making a column composed of a number of small columns.

The building blocks are a light cream color slightly fire-stained with red, making a very pleasantly variegated surface,—the base and trimmings being red.

MASONS' measure is reckoned at $7\frac{1}{2}$ brick per foot super for each half brick of thickness of wall. To get the lengths of walls, measure the outside exclusive of pilasters. At re-entrant an-

hesitate to purchase the better article at its worth. The work of underdrainage, if well done, is a permanent improvement, once done, to last for generations. No one can afford to use imperfect material in underdraining any more than he can afford to build a costly house on a poor foundation. When the prices of tile are being cut very low, don't be in a hurry to sell. Money is often made by waiting for the "rain wagon," and other things. When parties have a good article they can afford to wait. It is well, however, to impress the trade with the importance of using only the best at a reasonable price.

Written for the Clay-Worker.

BRICKMAKING AND BURNING.

No. 9.

BY J. W. CRARY, SR.

[Copyrighted.]

It is an old saying that "doctors will differ," but intelligent doctors all agree about some things they have found to be true from long practice and well settled principles. How intelligent, practical brickmakers can disagree about the necessary kind of clay, for a certain specified kind of brick, how they can disagree on the best, proper manipulation of clay for making a certain kind of brick, how they can disagree about the principles involved in the best way to set and burn brick thoroughly, I am at a loss to see. The many vague and speculative ideas I notice by writers on brickmaking and burning, shows the great need of some well styled principles and formula for the common guidance of brickmakers. There are various kinds of clay when chemically considered, but only two forces can be used to make any of the varieties into a brick, viz.: Cohesive attraction by pressure, and crystalization in the drying process by tempered, plastic clay. Now all intelligent brickmakers must know these facts. Now it follows as a corollary that if brick are to be made of plastic clay, then the more it is disintegrated and tempered, the better and more perfect the crystalization. It also follows as a demonstrated fact that if brick are to be made of "dry clay," then the more it is pulverized and comminuted or stirred together, the more perfect the cohesive attraction under the necessary process. It also follows that the pressure must be perfect, so that all the particles are completely joined, otherwise the principles upon which the good quality of the brick depends, is only partially carried out.

DRYING, SETTING AND BURNING INVOLVE CERTAIN PRINCIPLES.

All brickmakers will admit that brick must be dry enough to stand the pressure of about fifty brick, or about three hundred pounds to the brick on edge, before they go into a kiln. They will also admit that brick must be set in such a way and manner, as will allow the heat from the arches, or furnaces, to freely pass up through the body of the kiln, and that any interruption of these features and conditions, is a violation or departure from the true principles involved. All good brickmakers further know, that only a certain amount and

degree of heat can be safely applied to a "green" kiln of brick, and that when a kiln is dried off and the "fires up," the fires must be increased to a degree hot enough to indurate the clay, through and through, and kept at that heat, until it appears all over the top of the kiln, whæether it settles or not. Now, I notice that some writers talk about the practicability of making any kind of brick of clay. I notice that some writers treat setting and burning brick as though all kinds of clay should be managed exactly alike, and put in a lot of crotchets just by way of saying odd things, such, for instance, as that "there must be three bricks in a 'bench,' five high in the overhangers, and two of these courses tight, then the platting must be put on two courses fast, and first course of green brick, an inch apart, and next, or top, of whole, good burned brick, tight together, except at intervals of five brick, while watersmoking, then if there be a cold spot, the platting to be closed tight (where it was left open) until the cold spot gets hot, etc., etc." Now why should there only be three brick "benches?" Why should any of the overhangers be set tight? Why should whole green brick be put on top of the kiln, for first course platting? Why should whole, good burned brick, be put on for top course platting? And why should they be put on tight? And why should every fifth course be left out? And, in the name of common sense, I would like to know, why these apertures are to be closed in order to work out a "cold spot?" All these things are old worn-out whims, and have neither reason, force or utility. I tried them all forty years ago, and was glad to go to their funeral, so far as I was concerned.

THE QUESTION OF "SETTLING BRICK KILNS"

Has lately taken a start. I have already discussed this matter in my former articles, before which time, not a single writer on brick burning, seemed to know that some clays would not shrink in burning, but they begin to pop up now, and say, "I told you so." I noticed a writer in the Clay-Worker, seemingly the oldest in it, alludes to clay at Mississippi City, and Slidell, La., that will not shrink in burning. I had long ago said in one of my articles, that all the Gulf coast clays would not fuse or shrink in burning, but some of it would swell. I also stated, that at some localities in Arkansas, Missississippi and Alabama, in the interior of these states, clay is found of the same character, and that I knew this fact

by actual, personal and thorough experience. I have not yet written a single word about what I know of brick, from hear-say, nor have I borrowed a single idea from any other writer. Without referring to my articles, I think one of them, concisely treats of the causes of shrinkage in clay that will "settle" in burning. The idea that clay will "settle" when the air is expelled, is vague and without reason. When silicate of alumina, or pure sand and clay is used to make brick, it will stand a glowing white heat without fusing and if the sand is in excess, a brick will swell. Now, if an alkali or flux be mixed with this clay, it will shrink and fuse just in proportion to the amount of alkali mixed with it. As I have before stated, I have mixed fusible clay with infusible, about half and half, and found the brick would fuse and shrink in burning. I have put two ounces of soda in a brick of infusible clay, and found the brick shrunken after burned. If infusible clay be made plastic, with strong lye water, it will shrink and fuse in a very hot kiln. My clay is infusible, don't shrink or swell, and burns to a cream color. I have put brick in first course below top of my kiln, made of the common red and yellow clay used to make red brick, and when I opened the kiln, the red clay brick was found liquified and run down the kiln. It takes a glowing white heat three days and nights to burn my clay. It may be proper here to repeat the should-be, well-known fact, that most all the diluvial and alluvial clays—such as are found on the plateaus and banks of our rivers, are fusible, and will make good red brick, with proper use and burning. It is the anti-diluvial primitive clay with sand, forming pure silicate of alumina, that is infusible, and will not settle.

THEORY OF SETTLING A KILN OF BRICK.

In all fusible clays, there is a certain quantity of flux, or alkali and iron, when the heat of the kiln is sufficient to oxidize and fuse the flux in the clay, the particles of clay are soldered together, and thus the pores or spaces left in the brick, in the drying or crystallizing process, are contracted, and to a good extent closed, so that the brick is shrunken, and hence the kiln is "settled," as we say, of course, there will be no "settle" if there be no solder.

TO GET A GOOD, BRIGHT RED BRICK.

In the first place, there must be a certain amount of iron rust, or oxidized iron, in the clay to give a red color, when heated to a certain degree. Second—

Care must be taken, to see that the heat is not sufficient to fuse the alkaline salts in the clay, as this will give the brick a dark, and iron metallic color. Third—No coal dust should be mixed with the clay, nor coal placed in the body of the kiln, as this will produce irregular heat, and oxidize the iron and salts, and leave a sulphuret of an ashy color, on the surface of the brick. To make good red brick, the clay must have the right quantity and kind of iron in it, then it must be thoroughly mixed and well tempered, then the brick must be set regular. There should be no large open spaces, nor should there be any obstruction to a free, regular circulation of heat, except the binding course just on the closing course of the overhangers. This should be tight so that the fire will spread when it strikes it. The benches of the kiln may be four brick or about thirty-four inches wide and should be set skintling or zigzag, open and regular, the overhangers should be set the same. In the kiln, the brick should be set three over three, and if a uniform or face brick is desired, two courses should be set, running same way, thus, reversing every two courses, instead of every other course; this prevents fire marks on one edge of the brick, and gives a better draft up through the kiln. One course of platting should be put on top, at least one inch apart, and it may be of whole brick, or of burned bats. The watersmoking should be slow, the outside arches, especially at the corners, should be kept a little the hottest. This insures good corners and outsides.

No "settle" should be made until the fires are all out on top, and then the heat should be gradually increased, until the overhangers are as hot as they will stand without fusing. This heat should be kept up with careful attention, and as soon as a spot begins to settle, damp, fine clay, should be put on that spot, so as to prevent further draft of heat to that point, and this process of covering with clay should go on, as fast as spots begin to settle, until the whole kiln be covered. As the covering thus proceeds, less fuel and labor is needed, and by the time the kiln is all covered, the use of fuel is reduced seventy per cent. When a kiln is ready to close, no fresh fuel should be added, but the doors should be closed tight, while the arches are hot. A kiln should not be opened until it is cold enough on top, to allow a person to pull up platting without burning the hands. Bats and clay should then be carefully

shoveled off, and the arches opened. No one of good judgment and experience, can fail to make good uniform red brick from two or three courses above the arches to top course of kiln, if these suggestions are properly followed. The same rule will apply to the setting and burning of clays, that do not settle, or burn red, only, that a far more intense heat is required, and, covering with clay as I have directed in other articles, being an indispensable necessity, if good brick are wanted. Setting and burning brick, so as to arrive at a uniform good standard for a brick, is of such importance, I will have more to say hereafter on the subject.

I will add here, that if there be any objection to covering a kiln with clay, as it begins to settle or "burn off," in spots, for fear that clay dust will get down in the kiln when being thrown off, the clay can be wet and tempered a little, so as to be a stiff mud, then put on the kiln, treading it, so as to close the platting. This clay should be quite sandy, so that it will not shrink much. This, when thrown off of kiln, will be burned in cakes and pieces, leaving no dust to fall down in the kiln. But I never find any trouble by dust, when I use damp, pulverized clay, about the same as the brick are made of. This plan of covering a kiln with clay, as I have directed, instead of trying to work the fires by closing the platting, or by changing fires in furnaces, or arches, will be found to be of great advantage and benefit to brick burners. It saves at least ten per cent. in fuel and labor, it gives complete control of fires, and insures a strong, thoroughly burned, bright colored brick.

Written for the Clay Worker.

A TALK ABOUT BRICK.

BY PROF. R. T. BROWN.

When in his transition from the savage to the civilized state man had passed the condition of a nomadic herdsman, and, abandoning his tent, he proposed to make for himself a permanent home, he would naturally look about him for the building material. With his rude tools of flint, he could work stone into the proper shape more readily than wood, but on the broad plains where he had pastured his flocks, stone could not always be obtained. He had no doubt observed that clay, on drying, became hard, and the suggestion would naturally arise, that if he put it into the proper shape while soft, and suffered the sun-heat to bake it, he had a building material that required

no tools to prepare it, and so long as he protected it from rain it would remain permanent. This was, very naturally, the first and oldest form of brick, and perhaps, was not the invention of any race or age, as we find the use of adobes connected with the early stages of every nation that has made any considerable advance toward civilization. The vestiges of a prehistoric age in almost every country show evidences of the use of unburned brick in the construction of the earliest human habitations. Not only in western Asia, in Egypt and in Ethiopia, do we find the remains of these primitive dwellings, but on this western continent, in Mexico and Central America, unburned brick was originally, and continues to be, the principal building material used for ordinary dwellings. In the rainless regions of Peru the nations, according to Prescott, had carried the art of making adobes to a wonderful degree of perfection. It is not at all improbable that the prehistoric race who built the earth-works and mounds of the Mississippi valley understood the art of making brick, though like other Aboriginal Americans they had not mastered the mystery of burning them.

This idea was suggested to me many years ago while examining a mound in the White Water valley in Eastern Indiana. The mound was on terrace, or second bottom land, composed of a sandy loam, resting on coarse gravel, two or three feet below. The mound was about twenty feet high and composed of strong clay, evidently brought from a hill, half a mile distant, for there was no clay nearer. Now why did the builders prefer to bring clay half a mile rather than to use the earth in the immediate vicinity, if they did not mould the clay? But if it had been moulded, the rains and frosts of centuries had reduced the clay to its original form.

Who discovered the secret of burning brick, or how it was discovered, will, perhaps, forever remain buried beneath the accumulated centuries. There is an Arabian legend which says some man built a house of sun-dried brick, and kindled his fire to cook his food against one of the walls. After practicing this for some time he discovered that the bricks thus exposed to the heat had undergone a remarkable change in color, hardness and permanence. But aside from the legend, it is evident that the discovery was accidental, for no man, from studying the sensible properties of clay could have come to a correct con-

clusion as to the effect of a high heat on properly prepared clay.

From the Bible account of the tower builders in Shinar, as well as from the oldest Assyrian tablets, it is evident that the method of rendering clay indestructible by a high heat was well understood 4,000 years ago, but we have no hint as to how the heat was applied, or what kind of furnaces were used. It appears, however, that in the early ages, burned brick was used only for special purposes. The great wall of Babylon, the most stupendous brickwork that the world has ever seen, had only a veneering of burned brick, two or three feet thick on the outside, the interior being filled in with unburned brick, the whole being protected by a waterproof covering of concrete.

The idea of an adobe wall was brought to its highest perfection in the rebuilding of Rome after the great fire of Nero. The walls were built of sun-dried brick laid in Roman cement, and hard burned brick about twelve inches long, six inches wide and one and one-half inches thick, were attached to the outside by being pressed firmly against a coat of evenly spread stucco while it was yet soft. In some of the ruins of ancient Rome, these tile-like bricks are found adhering so firmly that the brick will break before the attachment will give way.

Much of the superior excellence of ancient brick was owing to their being perfectly dried before they were burned. Pliny tells us that the Greeks would not allow brick to be used till they had been dried five years, but this probably refers to adobes.

After the invasion of the northern barbarians, the art of brickmaking declined with the decline of the Roman empire, till in the middle ages it was almost entirely lost in Europe; but in eastern Asia the art appears to have retained its excellency unimpaired. China, Japan and India have made good brick from the highest antiquity to the present day. Even in the hill country of Nepal, north of Bengal, travelers report that the buildings are made of brick of the highest excellence and beauty.

Brickmaking revived in Europe about the middle of the sixteenth century, Holland taking the lead. Nearly all the permanent buildings in the modern cities of Europe, and in this country as well, are built of brick.

It is a fact worthy of a passing notice, that from the day of the Assyrian brick-maker, down through the ages, nearly to the middle of the present century, the

ancient method of making brick can be obtained in every country.

In the early years of this century all the brick in use was made of clay tempered by treading with horses or oxen. About 1830 the pug mill appeared in the western brick yards; how long it had been used previously in the East, I am not informed, but it was the first innovation on the ancient method of preparing clay for moulding. From this, the next advance was to fill the moulds as the clay was delivered from the pug mill, automatically. In 1839 a patent was granted to Jesse Reeder, of Cincinnati, to mould brick from untempered clay, by pressure. More than a million of brick made on this machine were used in 1840 in constructing a tunnel for the Whitewater Canal at North Bend, Ohio. These remain in a good state of preservation to the present. In 1847, Nathan Sawyer obtained a patent for making bricks from dry clay, and about the same time Woodworth and Morven got a patent for moulding brick on the same principle, but by a different application of power. From this beginning, machines for manufacturing, and kilns for burning brick have multiplied with astonishing rapidity.

These brick machines are now so numerous that we cannot even catalogue them. They may, however, be grouped in four classes: those which make dry pressed brick, semi-dry, stiff tempered clay, and soft mud brick. Many brick presses, both for dry and semi-dry clay, have proved failures from overlooking the fact that clay in every form is an *inelastic* substance and will resist a sudden pressure, however strong, while it will yield to a continuous pressure, though much feebler. The stiff clay machines operate on the principle of moulding drain tile, the tempered clay being forced through a die in a continuous stream and cut into the proper length of brick by an automatic arrangement. Machines are now so far advanced towards perfection that, at the present price of labor, hand-made brick cannot compete with those made by the better class of machines.

Numerous improvements have been made in the matter of burning brick, both in the kind of fuel and shape of kiln. Formerly brick was burned exclusively in clamps and wood was the only fuel used. Now permanent, and often continuous kilns are used, coal, crude petroleum, or natural gas is generally substituted for wood.

It is a law in all industries, that when an article is manufactured by machinery it becomes a commercial commodity at once. It was predicted that brick, from its great weight, and consequently expensive transportation, would not follow this law, but we are already demonstrating the fallacy of this prediction. Brick can now be made by machinery, burned by natural gas and freighted by rail 300 miles and sold cheaper than hand-made brick at the point of sale. Such is the present condition of the brick manufacture—what will be its future? In a matter that has progressed with the rapidity that brickmaking has in the last forty years, it will be hazardous to venture a definite answer to that question. The restless activity of invention on this subject is evidence that, in the public apprehension, perfection has not yet been reached in brick machinery, but what additional step shall reach that point, we dare not predict. But the advancing price of lumber, and the scarcity of reliable building stone, warrants us in saying that we are nearing the time when all private, and most public buildings, will be made of brick. An inexhaustible supply of the raw material, with improved machinery, will make brick the cheapest building material, as it is the best.

Written for the Clay-Worker.

HINTS ON BRICKMAKING.

No. 42.

BY "R. BRICK."

BRICK BURNING.

This department of brick manufacture is constantly coming to the front as the key to the situation. This is the point where most enthusiastic would-be brick-makers have met their Waterloo, and this is the rock that will wreck many another unwary mariner on the muddy seas of brickmaking.

There is nothing that makes me so utterly "tired," as to hear an alleged brick-maker tell how he burned a kiln in two days and four nights with just half the amount of fuel that any other man had ever used before. It is true that there is a vast difference in clays, some requiring more fuel, as well as more time to burn them.

The time it takes to burn a kiln of bricks is an insignificant item, and the amount of fuel used is a matter of secondary importance. The great objective point is to make a good burn, that is, ninety per cent. and upwards of hard bricks, with ninety-nine to one hundred per cent. of the brick burned fit for mar-

ket. Do this *every time*, and nine cases out of ten, you will succeed as a brick-maker.

The ruinous policy of sacrificing the quality of the brick, as well as destroying a large percentage of them to save a few tons or cords of fuel, and a few hours or even days of time, is followed by some manufacturers, and they will persist in it until they fail miserably.

I have known instances where manufacturers of brick compelled their burners to burn their kilns within a given time, and to do this, melted the arch bricks and left thousands soft in the top courses, to humor an absurd whim. Some of the best processes of burning are condemned by many manufacturers, because they require forty-eight hours more time than the process they are using, even though in the end, there is a considerable saving in labor and fuel.

I believe in using a kiln that *insures* the manufacturer a well-burned kiln of bricks *every time*, even though it requires more time and more fuel. A New York merchant can send a cargo of goods to a foreign port cheaper than can his competitors, by sending them at his own risk, thereby saving insurance premiums that others pay. Would he display business sagacity and foresight by this scheme? Is it not best to pay more money and secure his profits? There is just as much sense in trying to save paying insurance premiums on goods shipped by an ocean steamer, as there is in using a kiln that saves a little time and fuel, and risk having a poor burn.

Use a kiln that carries assurance with it, one that will bring forth good fruit every burn, to the satisfaction and profit of the owner.

It is not the intention of the writer to condemn a kiln that burns with little fuel and short time, provided it does its work well, turning out good brick with little or no waste; I only wish to show the folly of trying to gain time and save fuel at the sacrifice of good results.

I must add, however, that when we have secured a good kiln, it is then necessary to secure the services of a successful burner. We have not yet reached that golden era in our business where we can burn a kiln by "printed rules"—only requiring a man of muscle, with sufficient education to read the rules, to make a perfect burn every time. When this is done, then any one can take his chemicals, brushes and canvas, and his "printed rules," and paint pictures that will rival those of the immortal Raphael,

or Michael Angelo—or with mallet and chisel carve from a block of marble the "Three Graces."

I know it is risky to write so familiarly about this great subject, on the eve of the annual meeting of the brickmaking solons at Philadelphia, but I plead the privilege that age gives, and know that the brethren will have respect unto my gray hairs—those that have gone before, as well as those that still remain with me—even though they differ radically from me in politics.

Let us all meet in the City of Brotherly Love, and exchange views on this and other subjects pertaining to our great craft, as well as to determine the location of the World's Fair in '92, and any other small matters that may be suggested by my distinguished and esteemed friend Purington, of Chicago, formerly of New England.

Written for the Clay-Worker.

SEWER PIPES AND THEIR MANUFACTURE.

BY ALFRED CROSSLEY.

[CONTINUED.]

I will now attempt a description more or less complete, of the actual process and method of the manufacture of sewer pipes. In the early part of this paper, I gave a brief summary of the earlier attempts at sewer pipe making and of the processes in vogue. I will now speak only of the methods in use within the memory of many now living and show the marvellous strides which this industry has taken in that short space of time. Not over 40 or 50 years ago, if my information is correct, sewer pipes were made by hand in wooden and plaster moulds and we may readily suppose it did not take much capital to go into the business. About 40 years ago, I think, sewer pipes began to be made on a horizontal tile machine of the plunger pattern and worked by hand, horse or steampower, pretty much as drain tiles are now made, though in a much more primitive style. After that came the vertical machine worked by the rack and pinion motion, and the power furnished very often by hand. This, however, was a great improvement; larger sizes of pipes could be made and were in better shape to handle, but still the clay had to be quite soft to avoid breaking. I have a cut of one of these machines now, with a man turning the handle which would afford some amusement to a sewer pipe man nowa-

days. Nevertheless, this machine would make up to 18-in. diameter, unsocketed. It was made by Claytons', of London. The next step in advance, was the screw machine which was much in advance of any hitherto brought out. This remained for years the standard, and was used in all the foremost works in England, as also one on a similar principle and very much like it, in America.

It is about thirty years, I think, since Mark Richardson, of Leeds, England, began to make his improved screw machine. He and his successor built a great many of these machines and some of them were in use in England up to a very few years ago. As this was the last method in general use until the present style of direct acting, steam socketing machine was introduced a description of the whole process may not be uninteresting, if only for comparison with our present improved methods. The machine consisted of a vertical clay cylinder about 15 in. in diameter and bell shaped at the die plate which would receive dies from 3-in. up to 18-in. diameter. Into this clay cylinder was fitted a piston or follower, to which was attached a very strong steel screw about 3-in. diameter. A vertical motion was given to the screw by a powerful bevel spur wheel, in the hub of which was a brass or phosphor-bronze nut, which worked round the screw, and driven by a bevel pinion wheel and counter-shaft on which were fast and loose pulleys driven by a belt from the engine shaft. A very powerful cross-head was needed to receive the pressure from the screw as it slowly pressed the clay down through the dies.

The preparation of the clay for this machine was done on much the same principle as now, of which I will speak further in its proper place. The gang or set of men and boys directly engaged in the making of pipes by this machine, was about as follows: One feeder, one squeezer, two or three carriers off, one fettler, one whirler, one brayer in, one sponger off, and one turner up. This reads like so much Greek to one unacquainted with the lingo of the pipe yard. Nevertheless, a little explanation makes them all intelligible, as the men were named from their avocations. The feeder, of course, fed the machine with clay. The squeezer was the man who actually worked the machine and was so named from the action of the machine in squeezing the clay through the dies. The carriers off are, of course, easily un-

derstood. The fettler was the man who trimmed the pipes to the right length and dressed or finished up the pipes prior to socketing, and this dressing was called fettling, hence the name. This man's work was often very important as the pipes sometimes needed considerable dressing or fettling to make them perfect. The dies at that time were often made too thin and with too much bevel on them, hence the pipe as it came through had a torn or ragged skin. Tending to this, also, the clay had to be made not over half the stiffness as it is now used, or there was great danger of straining the screw or breaking the cross head. Nowadays, the principle of making a die so as to put a good finish on the pipe is much better understood. The whirler was the man who socketed the pipes and derived his name from the act of whirling the pipe round on a hand wheel in putting on the socket. The brayer in, was the boy who made the sockets ready for the whirler to put on the pipe. Bray is an old Anglo-Saxon word meaning to pound or beat, and is the same word used in Prov. xxvii, 22. "Though thou shouldst bray a fool in a mortar among wheat, with a pestle, yet will not this foolishness depart from him."

This boy had a shallow, wooden mould before him, the width being the breadth of the socket, and the length the circumference of the pipe; fitting in the bottom of this mould was a leather strap a little longer than the mould, to give a hand hold. Having adjusted the strap, the boy filled the mould with clay and then pounded or brayed it till solid, then with a wire he cut off the surplus clay, and the socket was ready for the pipe. The sponger off was a smaller boy who with a sponge and a piece of soft leather finished off the inside of the socket after the pipe was put down by the whirler. The turner up was a man who, when the upper or socket end of the pipe was dry, turned the pipes over and trimmed off the ends, when, after finishing drying, they were ready to be set in the kiln.

At that time, the pipes were always handled with drums and each size below 12-in. had three different drums to suit the various stages. The first was the squeezing drum, which had an extra length allowed for waste when the fettler trimmed off the ends, for in those days there was no mechanical cut-off, which now makes a perfectly true and clean end to the pipe as it leaves the press. The next drum was a fettling drum

which was a plain drum the exact length of the pipe with the shrinkage added. The third drum was the socketing drum which had a block on one end on which the socket was formed when being attached to the pipe. In making the pipes, 3-in. were made four at once, 4-in. three at once, 5-in. sometimes two at once and at others, one. All above that were made one at once. For all sizes below 12-in., the pipes were made one day and left to stiffen until the next, when the fettler took them in hand and trimmed off the ends smooth, and to the right length, dressed them on the surface and turned them over to the whirler, who then put on the sockets. I described before how the boy made the sockets in his mould, ready for the whirler. The whirler having with his drum set up a pipe on his wheel, gives it a spin round and with a piece of iron with saw teeth, scratches the surface of the pipe all round where the socket is to be put on and moistens it with a wet sponge or cloth. He then took up the socket on the belt out of the mould and wound it like a band of clay round the pipe and the drum head, which gives the inside form to the socket, handing the belt back to the boy to "bray in" another socket ready for him. Giving the wheel a twirl, he pressed and beat the socket firmly onto the pipe and then finished it with a "rib," a piece of wood cut out to the desired form for the outside of the socket. He then sat the pipe down and while the sponger off finished the inside of the socket, he went on with another.

From 12-in. upwards, the pipes were too heavy to be handled in this way and were lifted out by a swinging crane direct from the table of the machine onto the socketing wheel, where they were immediately socketed and thence taken to the drying shed on a saddle and barrow similar to those in use now. The fettling and socketing processes were thus in the larger sizes reversed, being socketed first, and in these sizes the ends were not cut off and trimmed until after the sockets were dry and the pipes turned up. I should mention here that there were one or more machines invented for socketing pipes after being made, but their use never became general in England, and the above described was substantially the method in general use. About seven years ago, in a sewer pipe factory in New Jersey, I saw the pipes made plain and then socketed on a horizontal machine, something like the one

referred to in England, which appeared to answer very well. The number of pipes to a day's work in those by-gone times, was regulated by the number of each size a whirler could socket on his wheel, and hence was called so many to the wheel. This regulated the day's work of the whole gang and when the machine hands had put out "a wheel," they stopped and went home, or, if they put out more, as they would often do if the demand required it, they were paid extra in proportion. The following were the number of 2 ft. lengths of pipe of each size reckoned to a wheel (or day's work):

3-in.....	700	9-in.....	300
4-in.....	700	10-in.....	250
5-in.....	600	12-in.....	200
6-in.....	500	15-in.....	120
8-in.....	350	18-in.....	80

This with our improved methods looks to be but a very insignificant rate of work.

It is about 20 years, or, probably something over, since the present form of direct acting steam pipe machine or press, began to take shape. The honor of the invention is given to Mr. Spencer, and for a long time afterward it was generally known as "Spencer's Machine." His first machine was for plain pipes, which had to be socketed by hand, but soon followed, socketing dies, by which a pipe with sockets made solid at same operation was produced, and in its essential features, was identical with the pipe made to-day. The principal makers of these machines were: Mark Richardson & Co. (and their successors), and John Bingley & Co., both of Leeds, England, which has become the center and headquarters for all kinds of clay working machinery, as it largely is for fictile productions themselves also. The original socketing dies were in two halves and worked in slides underneath the die plate. Such with some improvements is, I believe, the style still in use in England. With the advent of the socketing machine, the whirler and his attendants lost their avocation, the term "wheel," as applied to a day's work, lost its significance and went out of use. The number of 2 ft. lengths made for a day's work became about as follows:

3-in.....	1,600	10-in.....	700
4-in.....	1,400	12-in.....	500
5-in.....	1,200	15-in...2ft. 6 in. long...	300
6-in.....	1,000	18-in... " " ...	200
8-in.....	900	21-in... " " ...	150
9-in.....	800	24-in... " " ...	120

These figures, however, were often exceeded and the standard was gradually raised, as I shall show further on.

To be continued.



OFFICIAL ANNOUNCEMENT AND PROGRAMME

Of the Fourth Annual Convention of the National Brick Manufacturers' Association.

To the Members of the N. B. M. Ass'n.

GENTLEMEN:—

As announced in the official report of the proceedings of our last annual convention, the next yearly meeting will be held in Philadelphia, Pa., Tuesday, Wednesday and Thursday, December 10th, 11th and 12th, 1889.

PLACE OF MEETING.

The Convention will meet in Franklin Institute Hall on Seventh Street, between Chestnut and Market Streets. The following is the Programme.

FIRST SESSION, TUESDAY, 2:30 P.M.

Roll Call.

Reports of Officers.

Enrollment of New Members.

President's Annual Address—

Robt. A. Speed, Memphis, Tenn.

Election of Officers.

Paper, "Theory and Practice of Brickmaking"—

J. W. Cray, Sr., Bluff Springs, Fla.

Discussion of same.

NOTE: Each subject presented for consideration will be discussed by members of the Association when the speaker has finished.

TUESDAY EVENING, 8:00 P.M.

Second Annual Pow-wow under the auspices of the Philadelphia Brickmakers Protective Association, held in St. George's Hall, southwest corner Thirteenth and Arch Streets, Brother Murrell Dobbins Master of Ceremonies.

SECOND SESSION, WEDNESDAY, 9:30 A.M.

1. "Brickmaking in New England," address—
Geo. M. Fiske, Boston, Mass.

2. "Moulded and Ornamental Brick," essay—
James Taylor, Long Island City, N. Y.

3. "A Common Sense Talk on Brick and Brickmaking," address—John Cubbins, Memphis.

4. "Drying Brick," essay—
Edmund Webster, Philadelphia, Pa.

5. "Repressing Brick," discussion led by
J. A. Baggs, Bridgeport, Ohio.

THIRD SESSION, WEDNESDAY, 3:00 P.M.

6. "The Key to Success in Brickmaking,"
W. H. Brush, Buffalo, N. Y.

7. "Advantages and Disadvantages of Making Brick by Hand," address—
Jacob Dowler, Philadelphia, Pa.

8. "Some Lessons Learned in Thirty-five Years of Practical Brickmaking," address—
Hon. Geo. S. Oldfield, Norfolk, Va.

9. "The Stiff Clay Process," essay—
W. H. Alsip, Chicago, Ills.

10. Question Box.

FOURTH SESSION, THURSDAY, 9:00 A.M.

11. "Hints to the Inexperienced in Brickmaking" address—
J. A. Reep, Knoxville, Tenn.

12. "Paving Brick, their Manufacture and Use," essay
J. H. Calkins, Galesburg, Ill.

13. "Burning Brick," address—
Thos. R. McAvoy, Philadelphia, Pa.
14. "The Dry Press Process," essay—
S. J. Rose & Son, Chester, Pa.
15. "Burning Dry Press Brick," discuss'on
Led by—
16. Question Box.
FIFTH SESSION, THURSDAY, 3:00 P.M.
17. "Evolution of the Brick Machine," essay—
Geo. S. Tiffany, Tecumseh, Mich.
18. "Experiments in the Manufacture of Fuel for Burning Brick,"—
A. J. Baker Denver, Col.
19. Question Box.
Report of Committees.
Miscellaneous Business.
Adjournment.

It has been thought best to make up the programme entirely from members who have not heretofore addressed the Association in a formal manner in order that the current of thought and experience may be broadened and deepened. While in this manner it is hoped to obtain "new blood," we are assured that those who have rendered such valiant service in former years will be with us and again lend their welcome voices and good cheer, joining earnestly in the discussions as of old.

HOTEL ACCOMODATIONS.

Special arrangements have been made for the entertainment of members and visitors with the Continental Hotel, located on Chestnut Street, corner of Ninth, which, it will be remembered, was headquarters during the National Builder's Convention, also with the Girard House, which is just across the street from the Continental, and the Washington Hotel, on Chestnut Street between Seventh and Eighth. All of these are conveniently located within a few minutes' walk of the Franklin Institute in which the convention will be held. Directly opposite from the convention hall is the Philadelphia

MASTER BUILDERS' EXCHANGE,

which by courtesy of their Board of Directors, will be thrown open to members and visitors during the convention. All are cordially invited to make the Exchange headquarters during their stay in the city. Those desiring it, may have their mail sent to them in care of the Master Builders' Exchange.

REDUCED RAILROAD RATES

Have been obtained from all roads composing the Trunk Line Association, the Central Traffic Association and the Southern Passenger Association which include nearly if not all, the leading railways in the Eastern, Central, Southern and Western States. Over all these lines a two-thirds rate has been arranged for on the certificate plan as follows:

HOW TO SECURE REDUCED RATES.

1. Each person desiring the excursion rate must purchase a first-class ticket either lim-

ited or unlimited, to the place of meeting, for which he will pay the regular fare, and upon request, the Ticket Agent will issue a printed certificate of purchase

2. If through tickets can not be procured at the starting point, parties will purchase to the most convenient point where such through tickets can be obtained, and repurchase through to place of meeting, requesting a certificate from the Ticket Agent at the point where repurchase is made.

3. Tickets for the return journey will be sold by the Ticket Agents at the place of meeting at one-third the highest limited fare, only to those holding certificates signed by the Ticket Agent at point where through tickets to place of meeting was purchased, and countersigned by signature written in ink by the Corresponding Secretary of the Convention, certifying that the holder has been in regular attendance at the meeting.

4. It is very important that a certificate be procured, as it will indicate that full fare has been paid for the going journey and that the purchaser is, therefore, entitled to the excursion fare returning. It will also determine the route via which the ticket for return journey should be issued.

5. Tickets for return journey will be furnished only on certificates procured not more than THREE DAYS before the meeting assemblies and will be available for continuous trips only; no stop-over privileges being allowed on tickets sold at less than full fares. Certificates will not be honored unless presented within THREE DAYS after the adjournment of the meeting.

Should any station Agent fail to have a blank certificate a Receipt for the amount paid, stating that it is for one first-class fare and bearing the Agent's stamp should be taken and will enable the Secretary of the Association to obtain the reduced fare returning, and which cannot be done if no certificate or receipt is taken.

From all quarters—North, South, East and West—comes favorable and encouraging reports from our craftsmen who, without exception, express approval of both the time and place selected for our next annual meeting. There are unmistakable signs of increasing interest in the National Association and its work; many brickmakers who have not heretofore identified themselves with us are now joining the Association and will meet and participate with us in the work at Philadelphia. These indications of a constantly increasing interest on the part of individual craftsmen generally, is very gratifying for they bode a day of better things—a more rapid and general improvement in methods and products.

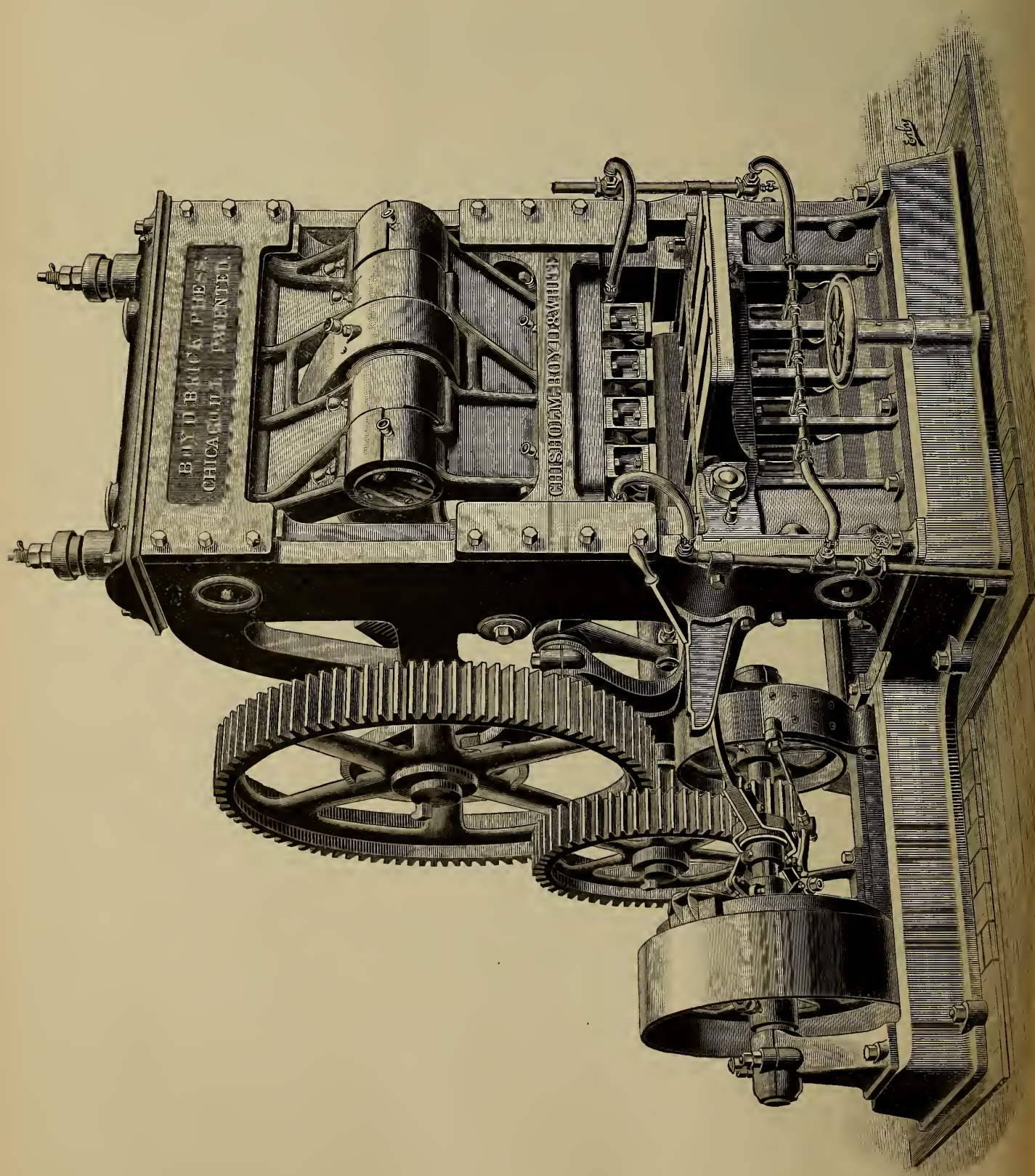
All who are interested in brickmaking, whether directly or indirectly, are earnestly invited to join the Association, attend the coming convention and lend their influence and assistance in the effort to advance the craft to the high position it deserves among the great industrial interests of this Nation.

Respectfully,

THE EXECUTIVE COMMITTEE.

by R. A. SPEED, Pres.

T. A. RANDALL, Cor. Sec'y.



THE BOYD BRICK PRESS.

Progress in the art of brickmaking during the last 20 years has developed the fact that superior brick can be made from clay by the semi-dry process. Those most experienced in the art claim that any clay that will make good brick by any process, will make better brick by the semi-dry process. The many failures made by inexperienced men in making dry pressed brick, led people to the conclusion that the process was a failure, except with certain clays having peculiar qualities. Hence prejudice has been strongly against the general adoption of making brick from semi-dry clay. In the writer's opinion, those failures were all caused by the lack of proper machines for pressing the brick and not knowing how the clay should be prepared, and how to burn the brick when made.

The man of progress, enterprise and energy who decides to adopt this process of making brick should not take the advice of men interested only in the sale of machines. He should find out where presses and machinery are being used successfully, go and investigate personally, see how the clay is prepared, how the brick are set into the kiln, what kind of kilns are used and how the brick are burned. He should observe carefully the staying qualities of the presses used, find out how long they have been in use, how many days they run in succession without breaking down or stopping for repairs, how many good brick they turn out regularly day by day, and at what cost per thousand. These things can be learned only by personal investigation. He should test his clay and know for a certainty that he can make merchantable brick from it, and then buy the best Press that can be got for the purpose, and use the kind of kilns that yield the largest percentage of perfectly burned brick. He should employ a man of experience in the manufacture of brick by this process to take charge of the works. If he does this, there need be no uncertainty in the business. It is only necessary to start right with the best machinery to insure success.

Advanced brickmakers are firmly convinced that the coming way of making brick is from dry clay. The preparation of the clay in most cases, is a very simple matter. Most of the successful Dry Press brickmakers harvest their clay during favorable weather. It is taken from the bank and allowed to dry in the sun and

afterwards put under sheds and allowed to cure and become tempered. While some parties are successful in making good brick by using clay direct from the bank if sufficiently dry for the purpose, it is universally conceded that all clays are greatly improved by being allowed to lie for some weeks or months to undergo a sweating or curing process before being made into brick.

Inventors of Dry Press Machines have done much to foster and encourage this process. Innumerable machines for pressing dry clay have been patented during the last decade, and some date back more than fifty years. One of the latest in this class of machines is the joint invention of Mr. James A. Boyd, who has long been identified with the brick interests, and Mr. B. C. White, a mechanical engineer who stands second to none in the profession. This machine is known as the BOYD BRICK PRESS, an illustration of which is shown on the opposite page. This Press, which has had a large sale during the past season, is claimed by the makers to meet all the requirements in the matters of strength, simplicity and durability. We are assured by Messrs. Chisholm, Boyd and White that they have placed this season twenty-one of their Standard Presses, each being first subjected to a thorough trial by the purchaser before acceptance, and in no instance has a Press been rejected, nor has any failed to give satisfaction. These 21 Presses at their minimum capacity of 15 thousand per day, would produce 60 millions of pressed brick during the season.

The Press shown in the illustration, is their four-mold Press. It occupies a floor space of about 8 feet by 7 feet and is about 7 feet in height. A friction clutch pulley is used, so that the Press can be started and stopped by simply moving the lever. The gears are all machine molded and hence are practically noiseless. The pressing is effected by immense toggles of enormous strength. The side bars take all the strain in pressing the brick, so that the frame of the machine has only to support the weight of the operating parts. As will be seen, the whole is mounted on a heavy bed-plate which prevents any part from getting out of line, however severe the work or pressure. The weight is about 10 tons, and the power to drive is from 8 to 12 h.p. Its minimum capacity is rated at 20,000 pressed brick per day of 10 hours, while its maximum for

making common building and paving bricks is estimated at 30 to 35 thousand on some clays.

A most important feature of Boyd's Brick Press should not be overlooked, viz.: The compound double pressure to which it subjects the clay, and the travel of the clay while under pressure down to the bottom of the mold and back. On account of these functions, peculiar only to the Boyd Press, the proprietors guarantee to put any kind of clay into perfect brick form without cracking and without the granulation so often seen on the surface of dry pressed brick.

We had the pleasure not long since, of seeing one of these machines at work. Its quiet, easy and majestic movement and its steady, regular work were certainly sufficient to excite the admiration of the most casual observer. Our readers will do well to thoroughly investigate the art of making brick from dry clay. Those desiring a fuller description of the Boyd Brick Presses, prices, terms, etc., are referred to the makers, Messrs. CHISHOLM, BOYD & WHITE, 185 Dearborn Street, Chicago, who, in addition to their 3 and 4 mold machines, also make one, two, six and eight molds.

FREAKS.

It is a fact known, perhaps, to not one in a hundred lovers of art in clay, that the renowned peachblow and dragon blood tints in Japanese ware that have been handed down to this generation are, no doubt, the result of pure accident, and the failure of potters to-day to reproduce them is not, as is commonly supposed, attributable to an "art" having been lost. By freaks of the fire, or, in other words, by inexplicable working of the heat of the kiln, effects are to-day being produced that are marvelous indeed.

The Rookwood pottery at Cincinnati, O., has one ordinary sized vase, not more than 8 inches high and 7 in diameter, and of plainest pattern, which no amount of money would buy. Its general color is a peculiar red, but if the vessel is moved so that the light strikes it on different parts of its convexity its color changes; and underneath a surface color is a pure gold tint. This piece is an accident. Nothing like it has been seen anywhere, and Prof. Morse and Charles A. Dana of the *New York Sun*, who spent a long while examining it, pronounced it the most remarkable piece of pottery ever produced.—*Ex.*

CORRESPONDENCE.

THESE COLUMNS ARE OPEN TO ALL. THE FULL NAME AND ADDRESS IS REQUIRED BUT WILL NOT BE PUBLISHED EXCEPT WHEN PERMISSION IS GIVEN BY CORRESPONDENT. THOSE DESIRING TO COMMUNICATE PRIVATELY WITH ANY CORRESPONDENT WHOSE FULL NAME IS NOT GIVEN CAN DO SO BY ADDRESSING LETTERS CARE OF CLAY-WORKER.

Machine vs. Hand Methods.

Editor Clay-Worker:

Your Philadelphia correspondent, "Kali," deserves a little attention from some one, or all, of the advocates of machine made brick. His letter in November Clay-Worker, is remarkably well written, and his arguments more than fair, from his premises. I sympathize fully with him and the others, who feel like skinning the "Skimmer" for his absurd statements. I came very near taking a hand myself, but after reading it over twice, concluded that Mr. "A. Skimmer" was perpetrating a joke upon us. I am not certain yet, that he seriously meant to have us believe him.

"Kali" says: "It takes the very best, strong clay, to make machine brick properly and profitably." This may or may not be true. It all depends on who decides on the quality of the clay.

My experience in brickmaking has all been confined to Chicago and vicinity. Even the advocates of hand made brick admit (under protest, perhaps,) that machine brick *here* have been a decided success. Scarcely any of the very high, and large buildings, built here within the past five years are of other than machine made brick. I do not think a hand made pressed brick has been used in Chicago for five years, and yet I doubt if any practical brickmaker would call our clay "of the best," though some of that obtained near the Stock Yards is certainly strong.

I take it for granted that "Kali" is a young man who desires, and intends to keep abreast of the times, but he has imbibed, to some extent, the dogmatism prevailing among the brickmakers of a generation or two ago. Their position is, that because a thing has not been done it cannot be. I used the first Chambers' machine in this city, and we had a large number of "Kali's" here who insisted that the process was impracticable. Some of the, then, most bigoted of their number are now the staunchest advocates of, and have achieved the greatest success in using the same machine.

The one conclusion of "Kali," that seemed to me to have been arrived at carelessly, was this: That "cheap machine brickmaking means reduced wages and more work for the labor." He could not have obtained any figures for such conclusions from any man in this locality, who uses machinery to manufacture brick. With the exception of the setters, wheelers and loaders, no man on my yard performs as much labor as the average of a hand yard. The three classes named all work by the thousand. The clay bank is ordinarily a place where hard work is done, but with the use of the steam shovel skill and care are far more requisite than strength.

From the time the clay leaves the bank until the brick are taken charge of by the wheelers and setters, the most laborious work performed by any one is the lifting of one brick at a time.

As to the wages paid and earned, the average pay of the hands on my yard at Purington during the past season has been \$2.52 per day. If "Kali" or any other hand brickmaker who makes only common brick can beat this record, let us hear from them. D. V. PURINGTON.

Chicago, Nov. 22d, '89.

Forms of Brick.

Editor Clay-Worker:

It is strange that among all the improvements in brickmaking so little alteration has been made in forms of the brick itself from the 4x8 rectangle. A difference in form is not difficult for the brickmaker and he is ready to make anything out of clay he can sell and the improvement must come from the builder or mason. And yet, the mason can make no radical departure from the everlasting rectangle until he has some other forms to experiment with. Both had better copy from the ancients, who used them of various forms and laid them in diverse combinations. Vitruvius, the most noted of Roman architects mentions bricks that were two feet long and 14 inches broad, and others 18x12 inches. Some were made especially for the construction of arches that were two feet in each dimension. Palladio, the great architect of Benice who lived in the earlier half of the 16th centry says they would be made greater or smaller according to the nature and of the building designed, and also speaks with much favor of some Roman bricks made in triangular form which were made one foot square and 1½ inches thick and had two lines cut in it from angle to angle while fresh, which divided it into four triangles. They were said to take up less clay, were easier managed in the kiln and more convenient to handle in building. They were mainly used in building city walls for defensive purposes, for which they were perfectly adapted. These walls did not have a regular face like an ordinary wall, unless they were veneered for the sake of appearance, but the apex of the angle projected in one course, and the base in the other, and the wall when struck with the battering ram exerted a thrust diagonally along the length of the wall, so that they were very much harder to break through than if built with regular cubes. There is quite a hint here that would likely to prove valuable in wall construction where lateral instead of vertical pressure were required and unique or artistic combinations would follow a change in form that would cost much less in building than our regular rectangle. Much of the labor of fancy brick work could be accomplished as cheaply as common brick can be laid, were the forms of brick varied to suit and produced in sufficient quantity to make them cheap.

H. C. W.

Yes, Reburn Them.

Editor Clay-Worker:

I am not a professional brickmaker, but have done something in the way of making brick. My information about the business, however, has been gained largely from the columns of the Clay-Worker. Further, I wish to ask if brick that have been burned already but not sufficiently hard and deep enough in color should be burned again—to harden more and give them a deeper color. I have as good a clay bank as there is on the Pacific Coast and commenced the manufacture of brick a few months ago. The first kiln was burned in five days and turned out hard enough, but pale. The second kiln was burned six days, had a splendid color, but not quite enough hard brick. Lately I have burned a kiln containing 130,000 brick, taking nine days to burn and there are not more than 20,000 brick hard enough and well colored. The others are pale and too soft. Is there anything that can be done to improve them?

I am also enlarging my yard and expect to use a dry floor soon, which will hold 45,000 or 50,000 brick. We intend to run during the winter. A repress is on the way and I will make as many repress brick as possible, the clay burning a splendid red color.

M. V. BRICK CO.

Wash. Ter.

[The brick referred to is evidently the result of unskillful burning. The fact that a portion of the kiln was hard enough and of good color is proof sufficient that if the other portion of the kiln had been alike well burned the brick would have been alike hard and high colored, unless the brick in different portions of the kiln were made from different kinds of clay. It is often the case in mining clay that one strata is mined and used, then a strata next below is used, the different stratas differing widely in their composition. One strata may be burned in much less time than another, and the color of the brick from different stratas may differ widely. It is usually best to mine the clay from top to bottom, mixing the different stratas thoroughly; unless it is desirable to discard one strata altogether or it may be desirable to use a particular strata to make a special kind of brick. If our correspondent is quite sure that his clay is uniformly alike from which the brick were made, then the trouble is in the burning. The heat has not been uniform throughout the kiln. In the burning of the kiln, see to it that the conditions are uniform from the beginning of the water smoking to the close of the burn. Some valuable articles on burning have been published in recent numbers of the Clay-Worker. It may be well to read them again and study them closely. Then exercise your best judgment in raising and holding the heat alike throughout the kiln.—Ed.]

Continuous Brick Kilns—Their Erection and Management.

Editor Clay-Worker:

As promised in the October Clay-Worker, I submit an outline sketch of the ground plan of one of the rectangular continuous kilns in use in the neighborhood of Peterborough, England, burning pressed bricks made from shale by the semi-dry process, with such modifications as experience has shown to be improvements. In some of the Peterborough yards plastic wire cut bricks are sometimes burned in these kilns, but when they are combined they are not mixed with the semi-dry bricks, but separate chambers are used, because the plastic wire cuts require longer time and more coal to burn than the semi-dry pressed bricks. It should be clearly understood in every instance (unless otherwise named) where bricks are to be referred to by number, English sized bricks are meant, and not American.

The kiln is 101 feet 6 inches long, and 74 feet wide, immediately above ground level, and contains 14 brick-burning chambers.

The chambers Nos. 1, 2, 3, 4, 8, 9, 10, 11 are each 24 feet long and 14 feet wide and hold 16,000 bricks each—or 128,000 in all.

Nos. 5, 7, 12, 14 are the same size, but as the corners are rounded off hold but 15,000 each—or 60,000 in all.

Nos. 6 and 13 are 13 feet long and 14 feet wide, and hold about 10,000.

Total number of bricks when kiln is full—208,000.

The smoke chamber is 60 feet 6 inches long, 10 feet wide, and 9 feet high, and contains 18 vertical flues, each one being capped with cast iron valves, worked from the top of the smoke chamber by iron rods. In the smoke chamber there are two spare flues, which can be used, one for the boiler working the machinery, and the other for an extra down-draft kiln. These two flues have in addition to the valves in the smoke chamber vertical dampers outside the kiln wall to prevent cold air getting below the burning chamber floor when the flues are out of use. The smoke chamber walls are 3 feet thick with pockets as shown, the end walls being 18 inches thick. The smoke chamber is covered with a semi-arch, with two $4\frac{1}{2}$ brickwork

rings. On each side of the shaft an iron door is built in the arch to enable the burner to enter the smoke chamber should anything happen to the valves. These doors should be oval, and large enough to get new valves in should those in use break.

Chambers Nos. 5 and 12 have each two flues—the two flues are not absolutely necessary, but they are useful, and assist the burner in getting the fire round the corner.

The block, or division walls are each 18 inches thick, with six openings (the end chambers having four openings) in same 8 inches wide by about 2 feet 9 inches high, to enable the fire to travel from chamber to chamber in the same direction as the figures. The reason why the second chamber from the end is numbered 1 will be explained later on, when the burning is referred to.

The doorways in the inner portion of the external wall are 3 feet 3 inches by about 5 feet six inches high, and they widen out at an angle of 1 foot 6 inches as shown. The external walls are two 14-inch walls, with 14-inch fether walls between, the outer wall acting as a buttress to the inner one.

The underground flues are 2 feet wide by 2 feet 3 inches high, with 9-inch brick sides, and covered with a semi-arch built in two $4\frac{1}{2}$ -in. rings. The openings into these flues for the smoke and steam, are shown in each chamber floor. The vertical portion of the flues in the smoke chamber are 3 feet in diameter, with 9-inch brick work around same.

The chimneys at Peterborough vary from 120 feet to 165 feet high, but this one will be shown 130 feet above floor level, experience showing this to be a very proper height. At ground level it is 4 feet 6 inches diameter inside, 12 feet outside, the outer ring being 14-inch and the inner ring 9-inch brickwork.

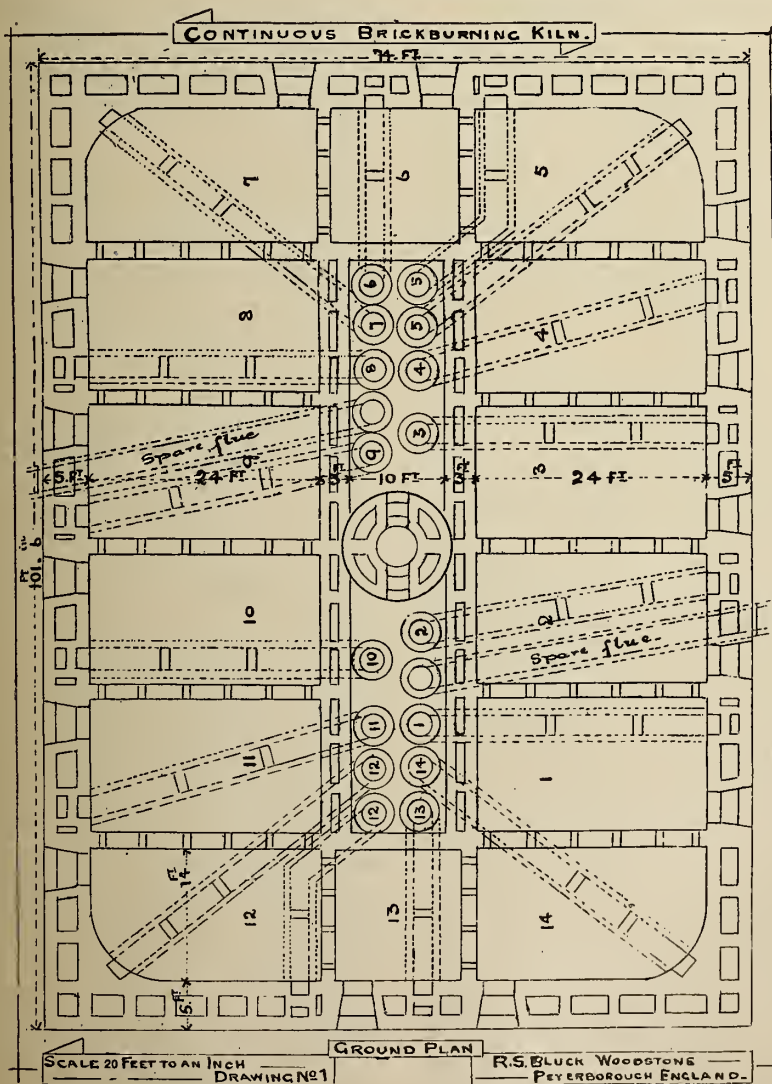
The pockets in the smoke chamber and external walls should be filled in with sand to retain the heat.

A further drawing will be given in the next Clay-Worker, and also instructions how to build the kiln from the commencement to the finish. Should any one not understand either the drawing or the description I shall consider it a pleasure to make the point clear on my attention being called to it.

Speaking in round figures the cost of a kiln similar to the one drawn, if built in England, would cost about £1,000, including the shaft and the ironwork.

A kiln of this description would take about sixteen weeks to build from commencement to finish.

At the time I am now writing a kiln of the same size as the one described is burning 120,000 bricks a week regular as as the clock goes round, and has been doing so for some months, but it is an exception to the rule, the average number being about 80,000 to 100,000 a week.



Brickmaking on the Ohio River.

Editor Clay-Worker:

I see that I have made a mistake in naming my subject. It refers simply to the fire and paving brick plants in the vicinity of New Cumberland, W. Va.

But as was remarked to-day, the various brick plants belonging to John Porter, the pioneer in the paving brick business, comprises nearly the entire output of paving brick in the "Panhandle." I do not know how many plants Mr. Porter owns or is interested in, but there are some five or six in sight of New Cumberland.

I have been here two days and have visited most of the plants, and would, if I had not seen so much, have been able to describe some one or more of the many interesting things, in a manner at least satisfactory to myself. I have been at some of the works the third time and am anxious still to make another visit.

Brickmakers as a rule know well the reputation of the clays in this locality. They have no superior, if equal, for street paving purposes.

I think about the first street paving brick of any note in the United States, were made here at the works of Mr. Porter, and many million brick are this year being shipped to distant cities, large orders going East as far as Philadelphia, Penn.

The clay is taken from beneath the coal measure. I was in one of the mines to-day and was particularly struck with the formation. The clay as found in the bank is very hard, resembling light gray limestone, except that it breaks with a smooth fracture. It is too hard to be handled with the pick, but is drifted and blasted the same as stone, when, however, it is exposed to the atmosphere for a few days it becomes comparatively easy to work. It is free from grit and stone and very plastic when tempered. It is easily molded into brick, but very hard to burn, requiring a very high temperature for vitrification, and hence, makes one of the best paving bricks that is to be found anywhere.

The depth of clay in the mines average from six to fifteen feet, and is found between a very good vein of coal above and solid rock below; above the coal is a layer of sandstone, which forms and supports the roof of the mine.

On entering the mine I was surprised to find the absence of props except at the entrance. I think one of the mines must now contain at least a mile of track and in all that distance not a prop is to be seen. But enough of the mine—what about the plant? I shall not attempt to describe all of them.

I was in one to-day which was a model, I assure you. The machine rooms were 10x90 feet. The dry room was 60x150 feet, all being three stories high. The first floor of the dry house was underlaid with tunnels supplied with heat at the lower end by a number of coal furnaces. The upper floors were slotted. Each floor would hold 30,000 brick. The brick are made on the lower

floor of the machine house and elevated to the upper floor by means of a very complete system of elevators. The brick that I saw made yesterday were to-day being put in the kiln, which require about eight days to burn.

Until recently all the brick made at these works were shipped by water which worked very much against a large output. Recently, however, the Pennsylvania R. R. have run a branch from the main line, at the river, east of Steubenville to the works at and beyond New Cumberland. Since which time the brick interests here have taken a new impetus and is now one of the largest paving and fire brick centers to be found anywhere.

Besides brick, New Cumberland can boast of having the finest white ware pottery works in America, together with several large sewer pipe factories.

I am informed that there are no idle men here and not a saloon in the county.

I visited one of the most handsome churches here to-day that I have ever seen. It is complete and modern in every particular. One that any city could be justly proud of. But why do I mention the church? Because it was largely built by brickmakers. Mr. John Porter being chairman of the building committee and one of the largest contributors. When you visit the brick plants at New Cumberland do not fail to see the First Presbyterian Church.

The West Virginia Fire Brick Co., John Porter, president, have just begun the erection of the Eudaly square down draft kiln to take the place of their present old round down draft and up draft kilns. Mr. Porter now hopes to burn his entire output of fire brick into good paving brick and in this way be the better able to fill his numerous orders for this class of brick.

BRICKMAKING AT ST. JOSEPH, MO.

Until the past two years all brick made here were by hand. A few mud machines were set up and placed in charge of men who knew very little of anything about operating them and as a result, they were condemned and set aside.

Last year the St. Joseph Press Brick Company was organized with a dry press and Little Wonder machine, burning old style. The yard was run by contract, and under poor management lost money to operators. This year under the management of A. J. Snell, a practical brick man, who on assuming charge at once put in Eudaly square kilns and getting new men has been very successful and is now making brick equal to any St. Louis press brick, and the company will close its year's business with a handsome dividend, to its stockholders.

The Brick and Terra Cotta Company was organized last spring and is using the Acme machine, made by the Frey-Sheckler Co., burning in Eudaly kilns, and are making as fine a paving brick as known. This company have been remarkably successful, brick being sold faster than they can make them, and they claim to run from 50,000 to 60,000

per day with their machine. They are using the blue shale ground in dry pan, and we understand are now about to put in a Wolf & Coleman Drier.

The King-Hill Brick Company organized last spring, has the working of a good yard, having first-class material (blue shale). The Penfield machine has produced some beautiful specimens of brick, which when properly burned equal any St. Louis press brick. They have spent considerable time and money with a new kind of patent kiln, without very satisfactory results. Their water supply gave out early in the season, which has placed them at a disadvantage. With proper kilns and management this will be one of the best yards in St. Joseph.

These machine yards all claim they can put brick on the market at a handsome profit and sell for what the mud brick cost.

The hand molders already see the "handwriting on the wall," as the brick produced with machines and better clay are so far superior to theirs that the brick layers claim as soon as the supply is great enough they will lay no more mud brick when machine brick can be had.

We have now one street—S. Eighth—paved with vitrified brick burned in the Eudaly kilns and it is acknowledged by all to be the best material and best paved street we have in the city; and from now on no other paving will be used, is the opinion of all.

The city was badly treated by the Asphalt Company in its contracts, and that of itself has condemned asphalt as a paving material here. In fact, most all western towns and cities are putting in brick for street paving. It being much cheaper and more durable. W. A. E.

The Village Brickyard.

Editor Clay-Worker:

I desire to thank your correspondents who in the October and November issues of the Clay-Worker have had something to say for the enlightenment of seekers after knowledge as to the cost of machine and hand-made brick. But it seems to me our friends who run machine yards or make brick machines to sell are not doing themselves justice when they have left their whole defense to Brother Skimmer, of Iowa, with his little yard of a million capacity. And, besides, Brother Skimmer's facts are not properly tied together. I had stated there was a profit in hand-made brick "clear of every direct and collateral expense of \$2.38 per 1,000 brick." He states there is a profit on machine-made brick of \$2.97 per 1,000 brick, but admits in his article that wear and tear of machinery has not been deducted, and it is more than probable that interest on his investment has also been omitted.

This is a little on the plan that a man says he can get his bread and butter for seventy-five cents a week, and forgets to tell how much the meat costs, while in truth it is about two dollars more.

I enjoy my Brother Skimmer's sym-

pathy for being behind the times. But the fact is I like to be behind the times, just about one day—it don't cost so much money to be a little conservative—there are lots of people who are smart in the morning and take right hold of the new idea, can see the end from the beginning like a cannon ball, red hot, for every improvement. And I am glad there is, for they teach us slow ones many things, but they don't often teach us how to make money. The fact is, by the time we see the good point they have made and are ready to take hold of said improvements, our smart friends are off on another tangent scattering the little money they have made to reach some more advantages. Well, I used to clerk for a machine business, and I'm pretty well booked upon labor-saving machinery, but I know a number of men who know ten times as much about it as I know or want to know, and can put my hand on several brother brickmakers among them who sunk their pile by being too smart.

Our market is more than half furnished by hand-made brick, and it is one of the largest markets in the country, and the little four-gang yard goes right on making brick and making money right under the same blue sky with the twenty-million brickyard across the way with its four machines and fifty-horse engines.

Perhaps some of our friends are not so good on figures as they are at making brick and do not see how easily the profit is to be accurately counted. If they care to look over gross figures of the village yard, possibly it may help them to present their figures for publication in the same or similar shape for ready comparison. In the following table column No. 4 being 5 per cent. on \$11,000, uniformly each year; the balance of the column noted being for loss on tools, sheds, kilns and horseflesh.

Year.	Brick Sold.	Gross Profit.	Loss & Interest on Tools	Net Profit	Profit @ 1000 Brick.
1881	\$ 958,000	\$ 3,188	\$ 898	\$ 2,290	\$ 2.39
1882	1,179,000	3,543	832	2,711	2.30
1883	858,000	2,667	1,003	1,664	1.94
1884	1,055,000	3,158	936	2,222	2.11
1885	1,081,000	3,314	950	2,364	2.19
1886	1,468,000	3,591	1,332	2,259	1.54
1887	1,017,000	2,340	1,049	1,291	1.27
1888	1,067,000	2,552	801	1,751	1.64
	\$ 8,683,000		\$ 7,801	\$ 16,552	\$ 1.50

This loss may seem heavy to some who have not had to move about with their yards, but previous business experience had taught some very practical lessons as to the common errors of an inflated account of stock. A little calculation will show \$3,401, or an average per 1,000 brick of 39 cents has entered into the cost of the brick in this way, and for interest \$4,400, or an average per 1,000 brick of 50 cents. Here, then, we have for this period of eight years:

Net profit per 1,000 brick	\$1.90
Interest	50
Loss on Tools	39

Total Gross Profit \$2.79

It will be readily understood by a little attention, that all the prices per 1,000 are obtained by dividing the money by the number of brick sold to produce the profit, no money of course being earned on unsold stock remaining in the yard. It will no doubt be noticed that the money earned per 1,000 has decreased in the latter years. This is owing first to continued increase of wages paid per day, and to competition on contracts, some of the losses on tools being augmented by damages from heavy storms breaking up shedding.

Of course such statements as these are of a decidedly personal character, and it is not to be expected any one would make them in their community over their own signatures. But I feel the utmost confidence that our editors of Clay-Worker may be safely trusted to publish for the general good of the craft even details of business such as these.

VILLAGE BRICKMAKER.

A Wisconsin Brickmaker's Views.

Editor Clay-Worker:

Your correspondent, "Village Brickmaker," has given us figures as to his profits by making brick by hand, and they are certainly amply large—namely, \$2.88 per thousand—to satisfy himself, and would be very satisfactory to many another fellow who cannot figure out the 38 cents, to say nothing of the dollars.

His claim that the use of machinery in brickmaking has not lowered the cost of production is fallacious in fact, generally speaking, and especially so, when the quality of the goods by the respective processes is taken into account.

We admit that a skillful hand-moulder can make a good brick, but no hand-moulder that ever "rolled a walk" can make as perfect a brick in angles and lines as are usually made by a good soft mud machine when the clay is properly tempered. When fire brick manufacturers used to make brick by hand they invariably had to repress them in order to get a brick that could be laid with a small mortar joint. Now, the larger part of all fire brick made in the country are made by machinery, and largely by soft mud machines and not repressed.

The question of the cost of making brick by hand or by machinery is hardly an open question, and is almost peremptorily settled by the exigency of the case. The immensely increasing demand for brick all over the country has called for a very large number of brick plants to supply that demand. If the old hand moulding had to be depended on, where could the skilled moulders be found? It takes time and persevering practice to make a good moulder, and many who have practiced for years are still second-class workmen. Machinery supplies the place of skilled moulders and does the work in a superior manner, and without that domineering, ignorant cussedness, that so many of the old time brickmakers had to grin and bear from their workmen. For the benefit and amusement of our modern brickmakers,

many of whom, probably, never saw a brick made by hand, I will give two tables of figures, one by hand process, and the other by the soft mud machine process. In "ye olden time," in Philadelphia, the "stint" for a day's work for a "gang" (one moulder and two assistants—the mud having been previously tempered either by steam-power, horse-power or spade) was 2,700 brick. It is true they took care of them, and put them, when partially dry, in the storage or drying shed, but the brick "machine gang" does the same, that is, puts the brick on pallets, and the pallets in the racks, where they remain until called for by the wheelers.

Approximate cost of making 2,700 brick by hand, namely:

1 moulder	\$2.50
1 mud wheeler	2.00
1 off-bearer	1.00
Digging, carting, and tempering clay, say,	1.38

\$6.88

Equals \$2.55 per M.

Cost of making 40 M. per day by a soft mud machine and pug mill, namely:

1 engineer	\$ 2.50
Fuel for engine	3.00
1 man to feed pug mill	2.00
1 stacker	2.00
1 dumper	1.75
1 sander (used sanding machine)	1.50
5 truckers—\$1.35	6.75
1 hacker	1.25
6 boys—\$.75	4.50
7 men getting clay—\$1.50	10.50
2 horses (short haul)	2.00

\$37.75

Equals 95 cents, Per M.

Difference in favor of the machine made, \$1.60.

I have no interest in any brick machine, and, farther, I would say, that the incidental expenses of a machine yard are usually much larger than on a hand yard. It will be seen that in the above estimates I have omitted cost of foreman, wheeling and setting, labor and fuel for burning, as these are the same in both systems. I may also add, that by the use of an "Auger" machine, where the clay is suitable, the cost of making should be from 20 to 25 cents per M. less than by a soft mud machine.

"Village Brickmaker," and the gentleman from Iowa, have had the courage to speak out in school and tell us their profits, and whilst we may admire their courage, and do not for a moment doubt or question their veracity, I must say, that our friend from Iowa has presented his case in such a way as to be misleading to the uninitiated. He gives the selling price at \$5.25 per M., and the profits at \$2.97. This leaves \$2.28 per M. as the cost of making, including labor and fuel. This beats me. He does not say whether the prices named is for brick at kiln or delivered at the buildings. We may surmise he is foreman, setter, and perhaps, burner, and for all this he makes no charge. Possibly, he may

have some boys who have given important help, and he has treated them with the same liberality that he has treated himself, namely, makes no charge. Now suppose he had some stockholders in the business with him, and he made one million brick at a profit of \$1.50 per M. (a fair profit) and he charged \$1,500 a year for his own services, there would be no rich profits in the business, and the stockholders would feel blue. If Mr. S. has included his own services in the figures he gives, then, as I said above, he beats me. I cannot make, set and burn the brick for \$2.28 per M. Brickmaking is an honorable and growingly important industry and the craft should be careful not to misrepresent, even unintentionally. This has been done to an alarming extent, chiefly by machinery men and aspirants to positions as foremen, and has induced very many to engage in the business who have been bitterly disappointed.

For the benefit of those who may think of engaging in the manufacture of brick, let me formulate a rule by which to estimate the cost of production that I think will be found *tolerably safe*.

Estimate from the best data obtainable:

The cost of digging, carting, tempering, and making the clay into brick, say,.....	\$1.00
Cost of setting, wheeling, say,.....	.40
Cost of labor in burning,.....	.20
Cost of fuel,.....	1.00
Incidentals,.....	.25
	\$2.85

Now multiply this by two and we have \$5.70 per M., which you will find at the end of your fiscal year, after counting *all* items of cost, and wear and tear on plant, will not be far astray. BADGER.

Republica de Columbia South America.

Editor Clay-Worker:

Your notice of my name in the June Clay-Worker, has brought me many catalogues from the manufacturers of clay working machinery in the States, but they come rather late. I was compelled to send my order for a small brick machine to England. The catalogues and the advertisers in the Clay-Worker impress me with the breadth of doing things throughout the United States and the smallness of my own country.

You have more manufacturers of brick machines, than we have of clay workers of all kinds, here. My brick works are the only ones that are run by machinery in this capital city, (Bogota) and are, so far as I know, the only works of the kind in this country. I have one English machine which makes a daily output of 8,000 brick. Either the slow work of the workmen or want of capacity in the machine, or the poor management of the business, or altogether, I find it impossible to make more than one million brick a year. So that I want nine years to do the work that the Memphis Brick Manufacturing Co. does in one year. What I lack most in doing, is the burning. I

have a square Dutch kiln and a round one, and good coal, but the brick of the higher layers are a pale red, and soft, or unsound, and the brick near the arches are rough and hard, and melted together in some places. I like the appearance of the Eudaly kiln, but I would like a small model of it, so I could see how it worked, but I dare not ask so much of him, neither do I know what it would cost, or what amount of money to send for his patent.

I burn fine pressed brick, with which the best points in the town are made. But I am compelled to put them in the middle of the kiln, and in a small quantity.

I sell the pressed brick for \$28 per thousand in the money of this country, or \$14 in American gold.

It will render me a great service if some one in the United States will tell me if they use mortar in the walls of the kilns to make them last longer and to keep in the heat and what is the formula for making the mortar.

RICARDO CALVO.

Burning a Kiln of Brick.

Editor Clay-Worker:

I have on several occasions been importuned to write an article giving my experience in brick burning. Having read the Clay-Worker very closely from almost its first number to the present time, and particularly the articles on the burning of clay wares, and having burnt a few kilns of brick, I have observed closely, making such notes as I thought important for future use to me in that line, I am still somewhat unprepared to say anything on brick burning.

One day I was closing up a kiln of brick. I had burned it as carefully as it could be done; had stood over and directed the firemen and the fires, and had kept a low heat, very much below the ordinary, and yet I found the arches had swayed over, and had apparently settled down under the heat that was only a little above a bright red. I was in a contemplative mood. The doctor came along, and in his friendly way asked me if I was shutting up the kiln for quits on it. He had heard some of the brickyard croakers and wiseacres re-report, which had been circulated, that Brix had failed on the burning of his kiln, or partially so at least. He was ready to condole with me if I was in need of sympathy. But I saw here a theme to make the case plain to him and answer all his inquiries in regard to the kiln in question.

I said: "Doctor, to my conception of the matter a kiln of brick being burned is very much like a man with a spell of sickness, with any of the epidemic or contagious diseases. You can diagnose his case, having a limited knowledge of the man, his habits, temperament and general health, you can approximate within a few days of the time when in all probability with good care, proper medication and good nursing he will likely recover. But should

he have a weak constitution, be dissolute in his habits, and not likely to be well cared for, then you can tell very nearly what his chances are to die. And so it is in the case of a kiln of brick. A proper knowledge of the clay gives the burner who is the doctor in the case, the opportunity to exhibit his skill as an adept. The firemen are the nurses, who have the care and handling of the patient, and they are to be governed by the directions of the doctor. The fuel is the medicine.

"If the clay is of such a nature that it will melt under a low heat and crush, then it is like a patient with no constitution, and cannot stand heroic treatment. Then we had better send for a Homeopathist and a lazy nurse to manage this case. But with another kind of clay, which is represented by another sick man, the case is different.

"Again, the kiln of brick is like a sick man in this respect: If the weather is favorable, nurses attentive and watchful, and the patient properly medicated and nourished, he will quite likely recover. But if the sick man has been exposed to cool drafts of air, or if the nurse gives him his medicine every time he wakes up after a nap, or if his diet is not nutritious, or is neglected in any manner, the chances are against him; or if he does recover it is with a shattered constitution, weak nerves, and a general wreck physically. So in the case of the kiln of brick every thing must be favorable, or if not, at some point there will be a lack of success, either wholly or in part."

The doctor acknowledged the soundness of the reasoning, and said that there were plenty of men who felt competent to prescribe for somebody else's ills who had no skill in preserving their own health. Many of the so-called or self-styled brick burners are ready to assume the place of doctor in the case, and direct and do a great many things that would not be done by the regular practitioner. They practice upon the patient, let him live or die; they ask a snug fee in either case.

The brick kiln is like a sick man in another respect. The ends of the kiln would represent his feet, and the arches his head. Usually in nursing a sick man we keep the feet warm and the head cool. This as a matter of course sounds unreasonable to advise that the arches of a burning brick kiln be kept cool, but what is meant is that the arches must be kept below the melting point, and not a particle above it. While the ends of the kiln with the cold walls and no fires, except from the sides represents the man's extremities. They must be warmed up by any means within the scope of the doctor's skill.

Favor these end arches with extra fire, close daubing of the cracks, and tight platting. A little fine coal run between the wall and the green brick will tend to help the case. The tight platting course and fine coal would be the blankets, and extra cover with a hot brick to each foot.

The doctor cannot be beside the pa-

tient every moment, or nearly all the time. He must eat, drink and sleep as other men. During his absence the nurses must give the patient close attention. The medicine must be administered until certain effects are produced, and not every one, two or three hours regardless of consequences. So with the fires, they are not to be made every so many minutes, but as needed. The fireman with his eye at the sight hole observing the heat of the arches, is the nurse with his finger on the pulse, noting the symptoms of the patient, his perspiration, respiration and temperature. When the heat has reached a certain stage or degree no more medication is needed except to hold the patient in that state until the doctor comes again. He may change his formula or prescription and the sick man begin to improve, and a cure is effected.

BRIX.

Reply to "A. Paver."

Editor Clay-Worker:

Here are facts and figures for you, from a yard using continuous kiln, railroad track at kiln. Wages \$40 per month for labor.

Semi-dry clay machine, 20,000 brick per day:

2 men in clay bank.....	\$ 3.08
1 man in clay shed.....	1.54
1 " at pulverizer.....	1.54
1 " " machine.....	1.54
2 men, wheel from machine to kiln	3.08
1 setter.....	3.00
1 engineer.....	2.00
Coal and oil for engine.....	2.00
2 burners, one day, one night.....	3.50
5 tons coal slack, \$1.80 per ton.....	9.00
60 c. per M. paid to remove from kiln to cars.....	12.00

Total.....\$42.28

Cost of brick per M. \$2.11

I have told you what we could do with dry press, now see what we can do with stiff mud machine, 30,000 brick per day:

2 men in clay bank.....	\$ 3.08
1 man at pulverizer.....	1.54
3 men, remove from machine to dry floor.....	4.62
3 men, remove brick from dryer to kiln.....	4.62
1 setter.....	3.00
2 burners, one day, one night.....	3.50
Coal for burning, 4½ tons, \$1.80 per ton.....	8.10
80 c. per M. to remove from kiln to cars.....	9.00

Total.....\$37.46

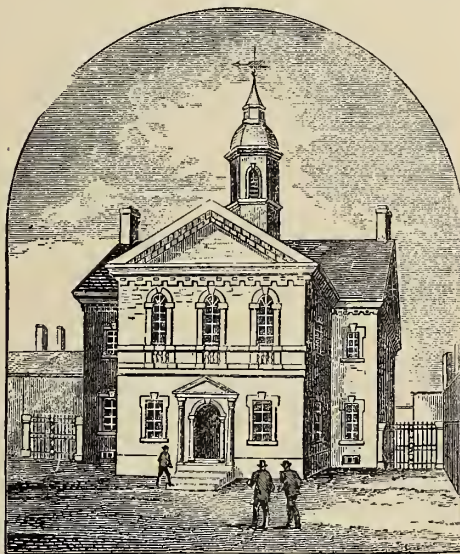
You can add your superintendent's and book-keeper's wages to this and you will see it is below "A. Skimmer's" figures.

If the dry press brick are stacked up and not loaded on cars, it costs an additional 40c. per M.—stiff mud brick 30c. per M. Cherokee, Co., Ia. W. W.

CARPENTERS HALL.

Among the ancient landmarks in Philadelphia, none are more conspicuous, and none better preserved than Carpenter's Hall. It is situated in an open court south of Chestnut street, between Third and Fourth. It was erected by the Carpenters Company, which was organized in 1824, when the city was but 46 years old. The guild of carpenters and architects was the first association of labor in the city of which any history is preserved. They built the hall for the special use of the company and for the general accommodation of public meetings. It is a large two-story building with a plain brick front, and wings extending right and left. It is surmounted by a modest cupola, and the whole structure is in a good state of preservation. The building was erected in 1770.

The first Continental Congress assem-



CARPENTER'S HALL PHILADELPHIA.

bled in this Hall in 1774, when the possibility of an independent government was suggested, in the event that the grievances of the colonies were not redressed by the crown. This Congress was a most distinguished body, embracing such names as Washington, Henry, Randolph and Adams. A provincial mass convention met in the Hall in 1775, which issued the memorable Declaration of Independence.

During the Revolution, the second story of this building was used as a hospital for sick and wounded soldiers, and afterwards (1791) it was occupied by the first United States Bank. Some years ago the Carpenters Company determined to repair the building and restore it to its primitive form and appearance, and

preserve it as a memento of the past. Its strict maintenance of correct architectural proportions, with the rigid simplicity of Quaker taste, makes it one of the notable monuments of that epoch and that people.

AS OTHERS SEE US.

Messrs. T. A. Randall & Co.,

Indianapolis, Ind.:

DEAR SIR:—We were engaged in looking over the November issue of the Clay-Worker when your letter of the 21st inst. was received, and will take this opportunity of expressing our satisfaction with the number—not only with the handsome way in which it is gotten out, but with the fullness thereof. It reflects great credit upon you as publishers, and upon the earnest efforts being made for the betterment of the trade in which we are all so much interested.

The letter from Mr. Greer, of Mexico, in itself points a lesson that might be profitably studied by users of machinery 'at home,' as well as in Mexico. Too, often it is the case that the failure to give a little intelligent study to the machine and to understand the purpose of its parts, results in a loss of dollars by the brickmakers, and an undeserved bad name for the poor machine builder.

To answer the question of your letter about our advertisement, we enclose new copy, but wish it to stay just where it is; on the first page of the first Journal of the Country representing our line, is where we modestly think we belong.

We are not making very much noise in our advertisements, but somehow we keep busy all the time, both in season and out, with all we can do. This "Thanksgiving Month" brings us a rich thick slice, with some raisins in sight.

Yours respectfully,

CHAMBERS BROTHERS' CO.,
per J. H. CHAMBERS, Gen'l Mgr

COMING CONVENTIONS.

The various Tile, Brick and Drainage Associations meet in Annual Convention as follows:

Illinois—Springfield, Jan. 21st & 22nd.
Ohio—Columbus, Feb. 11 and 12, 1890.
*Michigan—Adrian, March 11 and 12, '90.

*The Michigan Convention failed to meet last year, on account of the removal and resignation of some of the officers who were expected to prepare the programme and make other necessary arrangements. What arrangements will be made to hold a convention this year, we cannot say at this time. The matter will be left wholly to those directly interested in the work in that state.



INDIANAPOLIS, IND., DEC., 1889.

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as second-class matter.

Terms of Subscription:

One copy, one year (in advance)	\$1.00
One copy, one year (if not paid in advance)	1.50
Six copies	5.00
Ten copies	8.00

Subscribers when ordering a change of address
should give both the old and the new address.

ADVERTISING RATES furnished on application.

Correspondence on all subjects of interest to Clay
Workers is solicited. Communications from prac-
tical men will always be welcome. Address all
communications to

T. A. RANDALL & CO.,
14 & 16 S. Tenn. St., Indianapolis, Ind.

CLOSE OF VOLUME XII.

This number brings us to the close of
Volume XII, and also to the year 1889.
In making a retrospect of the work we
find that it has covered a broad range of
practical thought and experience. Much
of this is the work of our correspondents
and it is the outgrowth of daily practice
and careful observation. In making the
results of their labors a matter of record
through the columns of the Clay-Worker
they have wrought well for the craft.

* * *

The attentive reader has found much
to set aside in the storehouse of memory
for future use. So it is, indeed, what we
do to-day has to do with our success to-
morrow. What we build to-day in the
erection of the walls of our characters as
individual members of the craft, becomes
the foundation upon which we build to-
morrow. As brick follows brick in the
building of the wall, so day follows day,
and year follows year. And it is not
more so in the building of the wall than
it is in conducting the work of publish-
ing a journal for the use of the craft.
If we have made a good selection of ma-
terial, and have exercised skill in the
setting of it in place then our work on
the structure brings to us the gratifying
satisfaction of having wrought faithfully
and well. Of this our readers and pa-
trons are the better judges. There is,
however, from our standpoint, much to
commend in the material that has been
furnished us. Each contribution made
of the material at hand, has served a

purpose in the building. It is all good,
but here and there there are ornamental
as well as useful panels, to which we
point with pride. Panels that many of
our readers have seen fit to commend
highly—the best of terra cotta.

* * *

We close this volume and the year's
work on the Clay-Worker with the con-
fident assurance that what has been done
during the year now closing will serve
well as a foundation upon which to
build the coming year or years. We
cannot well close the work of the year,
indeed we feel that it would be incom-
plete if we failed to give expression of
our gratitude for the kindly and efficient
service of our correspondents—they have
our sincere thanks.

* * *

We would remember also our adver-
tising patrons; their patronage has been
liberal, and we appreciate the service.
Indeed we have, as we think, a com-
mendable pride in pointing to the ad-
vertising department of our publication.
Our patrons in this department not only
serve themselves in the wealth of their
illustrations of machinery, but they
make it instructive as well. Wherever
the Clay-Worker goes, in this and in
foreign countries (for we have a large
foreign list) it is educative. It gives a
view of the breadth of our operations in
this country. It is educative in the
sense that through this department the
advancement of the craft is indicated.
While the money side of this depart-
ment is gratifying, yet there are other
and commendable reasons why we have
a pride in this part of our publication.

* * *

With the kindest wishes for our
readers and patrons we close the work of
the year, full of hope for the future. Be-
lieving that we shall be able to render
better service in the year and years to
come, on account of our increased fa-
cilities, than we have in the past.

THE TWO GREAT FIRES.

Two great fires following in rapid suc-
cession at Lynn and Boston, Mass.,
involving losses amounting to many
millions, bespeak a general flimsiness of
construction unlooked for and unneces-
sary, at least in a city so old and wealthy as
Boston. Buildings in cities are constructed
too much for show and too little for endur-
ance. We do not decry the ornaments,
but we hold that the stability of a build-
ing should be the first consideration and

display the second. European cities are
not subject to the nearly instantaneous
and complete combustion to which our
American cities are subject. One really
good building on a street does not serve
to make a fire-proof city. A row of
flimsy walls whether of brick, stone or
iron will not stand when their interiors
are filled with kindling wood, and there
is no material except brick that will
withstand the intense, furnace like heat
developed by acres of such buildings. In
truth, no ordinary wall of any material
will escape destruction, for although
brick is not altered by fire, the falling of
roofs and floors usually destroy the walls
by strain or impact.

* * *

There is such a wealth of fire-proof
finishing material that the use of wood
should be confined alone to door and
window casings. Terra-cotta and en-
caustic wares with cements and iron or
girders, are capable of superseding wood
in almost every instance, and while it
may cost a little more, and they do not
cost much more, the reduction of insur-
ance risks, the direct loss of from one-
third to one-half of the investment, the
indirect losses by confusion in business
and more than all in the total losses in-
flicted upon the stocks and fixtures, and
business of a multitude of tenants, all go
to make a sum that would twice build a
burned district in the most thorough
manner.

* * *

In the first place, walls are built alto-
gether too thin. Whether the material
be of brick or stone, matters little in this
relation. That which escapes fire is
destroyed by falling masses so that a
furnace once started, the economical
way of stopping it is to blow up a block
or two in order to remove further fuel.
The general use of iron is bad; even if
nothing but girders and floor supports
are made of it, heat will so expand it as
to destroy a really fire-proof building.
Where used, it should be incased in
brick and cement, or if lightness is de-
sired, the material known as "terra-cotta
lumber" is admirably adapted to insulate
it. But the whole subject is summed up
in the mania to build a big, showy build-
ing where the money is only sufficient
to build one of half the size if it were
built as it should be, and in our larger,
thickly populated cities, this subject
should receive legislative attention, for it
is unjust to the man who builds a really
first class building, that it should be sur-
rounded by blocks of fire-traps.

TRADE JOURNALISM.

A successful journal is one whose contents represent the thoughts, aspirations, and wants of its readers. An influential paper is one that by earnest effort and painstaking labor keeps in the advance of the popular mind and supplies it with the information it desires. People subscribe for a newspaper or magazine in order that they may become posted and keep posted in the work of the world. A trade magazine is only different from any other in that it collects, arranges and attractively presents the information peculiar to that trade. It is not that an editor is endowed with surpassing intelligence and with it condescends to impart it, but that he makes it his sole business to study the art he teaches, to study the art as it was practiced in other ages, or as it may now be practiced by other people—to sift out the wheat from the chaff—and to present it for the benefit and use of his subscribers. The vision of the editor is not more acute than his fellows but his standpoint is higher, and like the watchman on the tower he imparts the result of his vision to the people below.

* * *

But long time study and constant thought and practice makes him expert in the work and his judgment is educated so that his opinion on the subject he teaches is superior, and is so, because he has more material and a higher view. All this accounts for the great influence and power that an old and well conducted paper exerts, and people are influenced because they have confidence, and they have confidence because they have learned by long experience that the editors are painstaking workers and careful, accurate thinkers. It is only after a paper has been weighed in the balance of the popular judgment and not found wanting, that it may exert influence and not until it has lived and proved itself, can it properly aid the cause it represents. And this is even more true of the trade journal than of the political newspaper, because with the latter it is merely a matter of the ability with which political ideas already accepted are handled. But with the trade journal it must lead in the van of improvements that are yet in the future. It must be inventive and extract improvements out of the crudeness of the past. It must fertilize the minds of its readers out of the storehouse it laboriously collect. What it receives it must give out and it must give it out divested of all obscurity and rubbish or it will not

be available. In short, it must represent the wants and aspirations of its patrons.

* * *

Such a paper is an influence and an invaluable aid to every person who directly or indirectly is interested in a given trade. It is equally a necessity to the man who takes out the clay or the man that makes bricks or the man who designs houses, or the artist who creates fancies. It is an essential vehicle for a multitude of wants. It aids the man who buys and the man who sells, and becomes by common consent the general agent of its class.

* * *

But a number of circulars bound into a colored cover and labelled with the name of a trade is not a trade journal, nor a newspaper, nor indeed, anything but what it really is, a large number of private circulars that are put out by advertisers in a sort of clubbing system in order to save postage. They carry no influence because the recipients of them know them to be mere advertising "fakes." Advertising is, indeed, a part of the modern paper, but it is an adjunct, not an aim nor an end. Business men use them not for a convenient way of stating what could be said in a letter, but for the influence and strength of the paper. It is influence that they buy and not "space." It is because they know that a paper is thoroughly read, that they advertise in it, and not because it offers inducements of the put-a-nickel-in-the-slot-order.

TERRA-COTTA ORNAMENTATION.

There is a house on North Meridian Street, in this city, that has a genuine architectural novelty. It is a residence of the prevailing airy type, with a portico constructed of terra-cotta, in the early Norman style. It is the portico which we term the novelty. The roof is supported by two enormous pillars of terra-cotta, supporting a circular arch of the same material. The pillars are relieved with a light festoon that climbs from the base to the capital and improves what would otherwise be a smooth red surface. It is one of the recent applications of terra-cotta to the higher orders of architectural expression which the writer has several times referred to as a *desideratum*, and it demonstrates the almost illimitable opportunities for art expression in this universal and cheap material—clay. There is no other material that can compare with it in mobility, ease of production, or wideness of application. With proper handling,

relative to harmony in a whole building, there is scarcely a situation it cannot be made to adorn, and with a more general use of it, its cost is comparatively so light as to be within the reach of the most modest house building.

* * *

People follow settled habits altogether too much when they begin to build. They do not look around them to discover if there be any material that would produce better effects and we may add, that furnishers of such material do not advertise their products widely enough and people go on in using wood in fancy shapes that cost more to whittle out than a good terra-cotta coating would, and then invite an annual outlay for paint, putty and repairs that in five years would entirely pay for the clay product, which will require nothing. We are glad to see this innovation on our streets, for its value as an educator in the art and manner of building is incalculable. Those who see "will take no other" when the comparison of beauty and costs are considered.

THE SPIRIT OF PROGRESS.

Messrs. Jonathan Creager's Sons, of Cincinnati, O., write us under date of November 28th (Thanksgiving Day) enclosing copy for their ad., which appears on another page and add: "We trust you are this day giving thanks because you are the head of the best clay-working journal in America, as well as for the other numerous blessings you enjoy."

We are indeed thankful for the large measure of success we have achieved, and "the other numerous blessings," foremost among which we reckon the hearty good will and friendship of our many patrons. The knowledge that our efforts to build up and advance our trade interests is appreciated, is, of itself, a mighty stimulus for still greater effort. Our chief desire is to exert the utmost influence possible for the betterment of the entire craft, and to that end we shall strive most diligently.

MERIT WINS.

We have again been obliged to enlarge the Clay-Worker in order to accommodate our patrons both old and new. The gratifying feature to us is the fact that the increased patronage from old patrons comes unsolicited. We have resorted to no importunities nor have we made any effort or pretense of getting out a "special issue," yet this number includes eighty-two pages. Think it over.

HAS A GRIEVANCE.

T. A. Randall & Co.,

Pub's Clay-Worker, Indpls.

GENTLEMEN:—Will you grant me space in your journal to expose a piece of bare-faced plagiarism on the part of Mr. Chas. T. Davis, editor of your contemporary, *The Brickmaker*. On page 138 of the last (Nov. 15th) issue of that paper, under the title "Burning Paving Brick and Other Brick Requiring Toughness," I find, to my surprise, almost an exact copy of a large portion of my paper on the same subject, which appeared in the *Clay-Worker* for September, 1889, on page 158.

It is strange that a man of Mr. Davis's pretensions, and claims to high position, would so violate the rules and courtesies, (say nothing of law) of journalism and authorship, as to openly, and to all appearance, wilfully commit a literary theft.

This sounds harsh, but such action on the part of one claiming so much, deserves nothing less than bold denunciation. Any one comparing the two articles must see, that not only the thought, but, in part, the exact words of my article are appropriated, and this too, in face of the fact that my papers are copyrighted.

I heartily welcomed the advent of the *Brickmaker*, believing that it would prove an honest and fair co-worker with the *Clay-Worker* and aid you in your commendable efforts to elevate the clay-working craft. My disappointment is therefore two-fold, for neither you nor the craft can expect any benefit or aid from one who adopts the methods of a pirate.

J. W. CRARY, SR.

Bluff Springs, Fla., Nov. 22, 1889.

CLAY SHINGLES---ROOFING TILE.

We had the pleasure a few days since, in company with General Lew Wallace, of Crawfordsville, Ind., and John R. Elder and other capitalists of this city, together with Hon. R. B. F. Pierce and John S. Lazarus, officers of the I. D. & W. R.R. of making a run over this road a distance of 68 miles, to the town of Montezuma, at which point, J. E. Donaldson and others have quite recently established the manufacture of his patent Clay Shingle or roofing tile (as it is commonly called.) Gen. Wallace's sojourn abroad as U. S. Minister to Turkey and his travels in other European Countries where clay roofing tile are in common use has interested him in the

subject to an extent that he is quite ready to give material encouragement to the manufacture of clay tile roofing in this country.

Arriving at the works, which are situated near the I. D. & W. R.R. in the edge of the town, we find that the first kiln of tile has been burned and the men were emptying the kiln. The tile were fully up to our expectation—well baked, uniform in color, with little loss. Taking into account the fact that it is the first burn in a new kiln, the result is very encouraging, indeed. The machinery and appliances used, have in a measure, been improvised to demonstrate the feasibility of the enterprise, and some may not be the best excepting, however, the Raymond Repress.

The enterprise so far is a success exceeding expectations. The cost of manufacture is low enough to enable the manufacturers to put them on the market in competition with slate or iron roofing. Roofing tile if well laid, are good for centuries of use. Besides, there is not a roofing material in use that will afford such perfect protection against fire.

The Donaldson tile, while not being so heavy as other roofing tile, are admirably adapted to the making of a tight roof, one that will not allow the water of a driving rain to penetrate through the roof.

Men of capital are likely to take hold of this industry and manufacture the Donaldson tile upon a large scale. There is already a demand, several railway companies having expressed a determination of covering their stations and other buildings with this tile. In addition, inquiries are coming in asking when a supply can be had for private dwellings that are in course of erection or being planned for erection.

Mr. Donaldson deserves much credit for the energy displayed by him for the past five years in demonstrating in a small way the practicability of establishing such an important industry upon a broad basis.

A GREAT SAVING.

The Wassall Fire Clay Co., of Columbus, O., are using two of the Raymond Automatic Re-presses, the results of which seem remarkable. Two boys only are required to operate each machine, one or whom feeds the brick into it, the other removes and places them on barrows; 28,000 brick are thus made per day on the two machines. The same work formerly required 9 hand-presses

and 27 attendants, making a saving of 7 presses and 21 men, not counting repairs of presses and dies, which in the course of a year is an item of considerable magnitude. The cost of re-pressing brick is reduced to a minimum, while the results are fully as satisfactory as by hand.

A HEALTHY GROWTH.

Bennett Bros. & Co., of Wellington, Ohio, manufacturers of the "New Quaker" Brick Machine, have had an increasing trade ever since they started in business, and have finally outgrown their present quarters, and will at once erect large and commodious shops for the manufacture of their machines. As many know, who have bought machines of them, it sometimes took longer than it ought to to get the orders filled. Although their shop was run to full capacity all the year they were never able to get enough ahead of their work to do business as they ought to be able to do.

At the same time they make a new firm, bringing into the business Allen and Sidnell, of Norwalk, Ohio, two of the finest machinists and general mechanics in Ohio, one of whom has been water works engineer for six years, and the other was superintendent of a machinery manufacturing company, and had nearly 100 machinists under him for seven years. The new firm, which will be known as the "Wellington Machine Co.," is under contract to work 40 to 75 hands for five years, so that it will be seen that the new firm will produce many more of the "New Quaker" Brick Machines and other specialties than they have in the past, and will be able to give promptest possible shipment of their machines, which are already in use in all parts of our large country.

While the "New Quaker" is known for its many valuable points it will be still further improved for the coming season, and the new firm promise a still better machine than they have put out before.

The officers of the "Wellington Machine Co." are as follows: Frank W. Bennett, President; J. R. Allen, Hydraulic Engineer, Vice-President; W. E. Sidnell, Mechanical Engineer, Superintendent; Thomas Kirk, Consulting Engineer; Harry S. Bennett, Treasurer; Chris. McDermott, Secretary.

When the British capitalists have bought up the leading manufacturing of this country will they as violently oppose protective duties as they do now?

THE BROWN & HARROP MFG. CO. Of Portland, Indiana.

Not quite two years ago this enterprising firm of young men established themselves as Clay Machinery manufacturers, at Portland, Ind., and in that time have earned for themselves a national reputation. Their specialty, the "Leader" Brick and Tile Machine, is proving remarkably successful and the demand for it is growing constantly as the brick and tile makers throughout the country become familiar with its merits. Though they already have a large and well equipped factory they are now unable to manufacture the "Leader" fast enough to fill the orders for them, and will have to build additional shops and increase their working force largely.

Their "Leader" Brick and Tile Machine is designed for large capacity and long service. It is very simple and strong, and calculated to stand any reasonable amount of crowding for large factories, and will answer equally well for smaller factories, by reducing its speed, and applying less power. It is constructed entirely of iron and steel, the bearings are all outside, and protected from dirt and grit. The frame is a solid piece of casting, entirely surrounding the gearing, making a very rigid support for the shafts. The metal is placed just where it is needed for strength and durability. The cylinder is cast in two pieces, making the augers easily accessible. The screw case and head are combined in one, and bolted to the cylinder. It receives the bracket and all dies to 12, inclusive. The augers are made of the hardest iron, and are carefully ground. The hopper is large, having an area of over one hundred and sixty-six inches. The end thrust of the knives is against the front portion of the frame, and of the screw at the rear end, thus dividing the strain equally on both sides of the frame. Chilled washers running in oil receive this thrust, and the wear is reduced to a minimum. The item of lubrication has received due attention. This machine is so well proportioned that less power is required to operate it than any other machine of its class. The machine can be operated with a good twelve horse-power engine, and do a fair day's work for a small or moderate sized factory. For larger factories, more power is required. As a combined brick and tile machine, the "Leader" is not excelled. The cutting tables are handy and easily operated.

Besides the "Leader," they also manu-

facture Tile Machines, Clay Crushers, Elevators, Etc., and solicit correspondence from all who are in need of anything in their line.

READ THE VERDICT.

What is Thought of the Potts' Horizontal Stock Brick Press by Those Who Are Using It.

Office of

CAMP & THOMPSON,

Manufacturers of

Summit County Sewer Pipe & Fire Brick,
Glazed Drain Tile & Hollow Brick.

C. & A. Potts & Co.,

Indianapolis, Ind.:

GENTLEMEN:—In reply to your letter of the 5th inst. would say the Brick Machine purchased of you last June has given entire satisfaction, and has done everything you claim for it to do. The Mould Sander we consider indispensable, and are more than pleased with it.

Very respectfully,

CAMP & THOMPSON.

Office of

THE VALENTINE BRICK CO.,

NASHVILLE, TENN., Oct. 11, '89.

Messrs. C. & A. Potts & Co.,

Indianapolis, Ind.:

GENTLEMEN:—I take great pleasure in referring to yours of the 5th, regarding the HORIZONTAL STOCK Brick Machine purchased of you last spring. Our plant is a new one and we have tried various vertical machines, as well as the Dry Press, and all of them have proven entire failures in our clay. The clay is of a very sticky nature, and the general impression among brickmakers was that the clay would not make brick. The plant was on the very verge of being removed to another location, when your machine was brought to our notice, and we decided to give it a trial. After removing the old machinery and putting yours in position, and starting the same, we were convinced that the fault was not in the clay, but in the machinery we were using. After a thorough trial we were convinced that your machine would do all claimed for it. We work the clay direct from bank without crushing or pulverizing and are now making brick that dry and burn without a particle of loss from checking or cracking as heretofore. The great pugging capacity, on which depends the success of manufacturing, drying and burning, the Horizontal Press feed and its immense strength for working the clay stiff, and the Adjust-

able Press box, are points which every brick manufacturer should examine into. We are more than pleased with the machine in every particular, and would recommend it to every Brickmaker, who desires to get first-class results. With many wishes for your success with the Horizontal Machine, as I firmly believe it the best machine for the trade now offered. I am

Very respectfully yours,

GEO. FRIES, Supt.

DENIES THE ALLEGATION.

Office of

ANTHONY ITTNER,

(Successor to Ittner Bros.)

BRICK MANUFACTURER.

Yard: California Avenue and Sidney St.

St. Louis, Mo., Nov. 9th, 1889.

NOTICE TO BRICK MANUFACTURERS.

Certain unscrupulous persons interested in the sale of brick machinery have falsely represented that I am pecuniarily interested in the sale of the Andrus Brick Press, four of which I use at my works in St. Louis.

I deem it due to the manufacturers of the Andrus Press to contradict such false statements, and I hereby state positively that neither myself nor my brothers have ever been interested or received one dollar's benefit from the sale of these machines. Our recommendations of the Andrus Press are due to its merit and the honorable course pursued by its manufacturers in the production and sale of reliable first-class press brick machine. I use two of these machines to make my common pressed brick and during the past season two of these machines have produced ten millions of bricks.

I use one machine for ornamental and one for face or stock brick, producing all that are required both in quantity and quality. The Andrus Machines at my works run with the regularity and precision of a good clock. They invariably make an even, pressed, perfect brick, unexcelled by any produced by any other machinery.

The Andrus Press is constructed upon the very best principles and I have found it to be all it is recommended to be by the manufacturers.

ANTHONY ITTNER,

Successors to Ittner Bros.

S. K. Fletcher, of the well-known firm of Fletcher & Thomas, Indianapolis, Ind., has been confined to his home by sickness for several days but now thinks he will be able to attend the coming National Brick Manufacturers' Convention.

EDITORIAL NOTES and CLIPPINGS.

A pottery is to be built at New Ulm, Minn.

A brickyard is to be built at Table Rock, Neb., by Beatrice parties.

The Troy (N. H.) Brick Co. had a small fire at their yards recently.

Egerton & Ford, Louisburg, N. C., contemplate starting a brick yard.

The Minnesota Brick Co., of St. Paul, has increased their stock to \$100,000.

R. J. Gurnell is using oil at his yard near Port Ewen, N. J., very successfully.

The Galesburgh (Ill.) Pressed Brick Co. will build additional kilns and a dry shed.

The Diamond Brick Works, at Layton Station, Pa., were burned recently. Loss \$7,000.

The North Hampton (Pa.) Brick Co. has been incorporated with a capital of \$100,000.

The Atlantic Brick Co., Rossville, L. I., N. Y., are looking for a brick burner and boss setter.

Jno. Welles, Washington Court House, Ohio, will probably build tile works near Dayton, Tenn.

W. H. Nesbit is enlarging his brickyard at Cerrillos, N. M., and will fit it up to run the year round.

The Purington-Kimbell Brick Co., of Chicago, will increase their capital stock from \$100,000 to \$200,000.

Streator, Ill., has large beds of excellent clay, and wants a brick and tile works started to utilize it.

Canandaigua, N. Y., wants a large brick yard established there. They have an abundance of excellent clay.

The Spring View Brick & Tile Co., of Puyallup, Wash., has been organized by Geo. E. Atkinson, and others.

The Meridian, Waterbury & Connecticut River Railroad Co., think of starting a brick yard at Cromwell, Conn.

Ten of the leading brick manufacturers of Chicago, have subscribed \$3,750 to their Worlds Fair guarantee fund.

Chillicothe, Mo., is thought to be an inviting site for the location of a pottery. There is an abundance of fine clay there.

The Peoria (Ill.) Brick and Tile Co. has been incorporated by William A. Fritchman, Geo. Spagle and S. O. Corera. Capital, \$25,000.

W. J. Ferguson, Waterbury, Md., intends starting a Terra Cotta Lumber Factory near there, and wants machine catalogues, etc., etc.

The Connecticut brickmakers have had a very unfavorable season, the output for the entire state will probably fall 15 per cent. below that of the previous year.

The Northwestern Brick and Tile Association of Chicago, has been organized by H. Blaisdell, formerly of Indianapolis, M. Pollasky and W. F. Chandler, of Chicago. Capital \$200,000.

Wilferd Twinch and others contemplate starting a machine brick yard at Spokane Falls, Wash., and would like to receive prices on machinery, etc., for a plant to make 50,000 fire brick a day.

The large and finely equipped vitreous china works of Knowles, Taylor & Knowles, at East Liverpool, O., were totally destroyed by fire Nov. 18th. Loss \$250,000. Insurance \$30,000. Will be rebuilt.

The *American Geologist* gives an account of the remains of an ancient glacier in Pine Creek Canon, Idaho. It is said to be quite accessible and will furnish an almost inexhaustible supply of ice. It will probably be mined for practical use, and distributed as a commercial article. This will be a new feature in the mining art.

Edison, the great electric wizard, says the scientific problem of this age is some cheap method of evolving electricity. A dynamo gets scarcely 50 per cent. of the power of the engine that drives it; and the engine gets but 10 per cent. of the power liberated in the combustion of the coal. The dynamo only gets about five per cent. of the force liberated.

Those who answer advertisements in the "Wanted, For Sale, Etc.," columns are sometimes disappointed because no reply is made to their letter. In such cases it is to be presumed the advertiser has made arrangements satisfactory to him and therefore thinks it unnecessary to reply. In no case are we responsible, for all such letters are always forwarded promptly on receipt at our office.

In some parts of the country, the crops of this year were damaged by excessive rains in the early part of the season, and in other parts by summer drouth, but both misfortunes taught us the lesson that tile drainage and deep cultivation may, to a great extent, counteract the influence of unfavorable seasons. Well

drained land, deeply tilled did not suffer serious damage from either extreme.

The Henry Martin Brick Machine Mfg. Co. request us to state that there are now twenty of their machines in use in and about Philadelphia and several more have been ordered for the coming season, which they think is an evidence of the reliability of the Martin machine. Their general business has been good throughout the year while their fall trade has exceeded that of any former year.

Messrs. W. B. Harris & Bros., of Zanesville, O., who have a national reputation as manufacturers of fine front brick, in addition to other improvements recently made, have put in the Raymond Automatic Repress, dispensing as far as possible, with their numerous hand presses. They expect to make the best quality of work on the machine and fully satisfied themselves as to this point before purchasing.

Fletcher & Thomas, Indianapolis, Ind., have just received an order from one of their California customers, for the fifth complete Heavy Steam Power Quaker Brick Machine outfits. Nothing could speak in higher terms of the reputation of brick machinery than such orders. They have also just sold a brickmaking outfit to a party in England. They report the prospects for the coming season as growing more flattering every day.

Preliminary surveys have been in progress during the last summer, by United States engineers looking to the irrigation of the great plain east of the Rocky Mountains, formerly known as "The Great American Desert." To accomplish this, it is proposed to store the waters of the tributaries of the Missouri from the Yellowstone to the Arkansas in their upper course, and distribute by canals. They must, however, make a proper account of the enormous evaporation in the dry atmosphere of that region.

I. & M. Wolff & Coleman report a satisfactory and growing demand for their Driers. They are now building a Drier for W. C. Hill, at Seattle, Washington, to dry 50,000 brick, also one for Drummond & Plumridge at Seattle, to dry 50,000 brick. They have just contracted for three Driers for the Meridian Brick Co., of Tacoma, Washington, for the Glens Falls Terra Cotta Brick Co., of Glens Falls, N. Y., to dry 15,000 soft mud brick and 8,000 repressed brick, and are now building a Dryer for S. Graham & Co., of Bordentown, N. J., to dry 30,000 brick.

It is said that the Red Lake reservation, in Northwester Minnesota, on which the Indian title has just been extinguished, will give \$25,000,000 worth of pine lumber, but it is estimated that it will be all consumed in five years to supply the demand for lumber on the treeless plains of Dakota and Northern Montana. In twenty years after that, the cottages built with it will have disappeared, and there will be no more pineries, from which they can be replaced. But fortunately there is an inexhaustible supply of clay there, from which the best of all building material, brick, can be made to supply the coming generations with imperishable structures.

It will be seen by reference to the ad. of the manufacturers of the Champion Brick Mold Sanding Machine (on the outside of the back cover) that they have shown good faith in their Caution to the public against manufacturing, using or selling infringing machines. We, of course, do not take sides in this controversy, but we await the decision of the Court to determine whether infringement exists or not. Manufacturers who strive to improve mechanical aids, are certainly entitled to the privilege of appealing to the Courts to determine their exact rights, and a friendly contest of this character is beneficial, as the decision is reliable information to the trade as to where they must go to get desirable machinery. May the right man win, is our wish.

In anticipation of an increased demand for Tank Furnace Blocks, the Christy Fire Clay Company, of St. Louis, Mo., has just completed some very extensive additions to their former large plant and to-day they have the most complete fire clay establishment in the United States. They have erected a large brick building exclusively for the manufacture of tank furnace blocks, this building is equipped with all the latest improved Clay Working Machinery which has been constructed especially for the Christy Fire Clay Company, the building also has a steam drying floor, covering an area of 18,000 square feet. The works of this Company cover six acres of ground in the southwest corner of their extensive tract of 260 acres, situated on the Morgan Ford Road in the city of St. Louis. The Company has unequalled switching and railroad facilities which enable them to turn out Tank Furnace Blocks of any practicable size, they load direct from the kiln into the cars. Messrs. Jno.

Jno. Johnson & Sons, of Franklin Square, New York, have just sold the Christy Fire Clay Company six improved clay presses, which are to be put up at their works in January.

THE COLUMBIA FALLS BRICK Co., Columbia Falls, Me. The officers of the company are: President, E. A. King, Boston; Treasurer, H. R. Thompson, Newton, Mass.; Clerk, Clarence Hale, Portland; Superintendent, H. W. Bucknam, Columbia Falls. The company has purchased 60 acres of clay land and 84 of wood land. The clay is entirely free from impurities and weighs 150 pounds per cubic foot. A brick made from this clay will weigh one-third more than an ordinary brick. The clay is well suited for terra cotta manufacture. The Company have at present a 40 h. p. engine and a 100 h. p. boiler, Penfield's Soft Mud Iron Machine, Pug Mill and No. 4 Crusher. The Company is turning out 36,000 brick per day. The present building is 40x65 feet, the dryer will be 60x150 feet. A kiln of 200,000 is already to burn. When complete there will be 16 kilns (patent). The plant will cost \$50,000 or \$60,000 when the present plans are carried out, and the plant will be the largest for making bricks in New England.

DINING CARS.

Indianapolis to St. Louis via Vandalia Line, Train No. 1, leaving Union Jtation, 11:55 A.M. daily.

It is by the adoption of improved devices for promoting the comfort of passengers, that this popular line has kept fully abreast of the times, and is always found in the front rank. Everything relating to comfort, ease, health, elegance and ministration to luxurious tastes, including ventilation, lighting, strength, safety, mechanical efficiency, ornamentation, superiority of appliances for supplying food or securing rest or sleep, has received due consideration on a marvelous scale, regardless of expense. The Vandalia affords the traveling public every class of cars, from the latest improved day coaches to the luxurious parlor, sleeping and dining cars. As soon as a want or chance of improvement is indicated, the managers are equal to the emergency, and vigorous efforts are speedily made to supply the new demand. The Vandalia is patronized by all classes of travel; is therefore endorsed by the public, hence its popularity is universal.

THE F. F. V. TO PHILADELPHIA.

The finest train between the West and the East, is the F. F. V. (Fast Flying Virginian), over the Chesapeake and Ohio Route, which runs to Washington, Baltimore, Philadelphia and New York, leaving Cincinnati at 6:30 P.M. and reaching Philadelphia at 6:15, the next evening. These facts are of interest to those who will attend the coming Annual Convention of the National Brick Manufacturers' Association, which meets in Philadelphia, December 10. The train leaves the Union Depot, Cincinnati, upon the arrival of trains from Indianapolis, St. Louis and the West.

This train has won fame for the new management on the C. & O. It is an elegantly and luxuriously appointed limited train, vestibuled from end to end, heated with steam from the engine and lighted with electricity. It runs through solid to New York, and is the only vestibuled limited with through dining car between Cincinnati and the East. The dining car is under the management of the Pullman Company and is equipped with every appointment of a first-class hotel, the menu comprising every delicacy. Meals are served *table d'hôte* at the uniform price of \$1.00

The C. & O. Route to Philadelphia is the most picturesque and beautiful in North America. Its charms are as varied as they are striking: The Ohio River for 160 miles, then the wild and roaring New River in its rock-ribbed canons, its banks lined with blazing coke ovens, then the towering Alleghanies and the soft Blue Ridge. All these and many other features engage the traveler's attention.

The rate of fare to the Convention will be one and one-third fare for the round trip. For information as to rates, etc., apply to agents of connecting lines, or address

H. W. FULLER,

Gen'l Pass. Agent, Cincinnati, O.

THE ROUTE TO PHILADELPHIA.

The Baltimore & Ohio R. R. offers egates to the National Brick Manufacturers' Convention the most attractive route to Philadelphia and at rates lower, from most western points, than can be obtained via any other through car line. Pullman's Palace Sleeping Cars are run through without change, to Philadelphia from Chicago, St. Louis and Cincinnati. In addition to the picturesque scenery along the line of the B. & O., all its trains between the East and West run via

Washington. Congress will be in session during the time of the Brickmakers' Convention, and as many of the delegates will desire to visit the National Capitol, either en route to or returning from the Convention, we would advise them to travel by the B. & O. R.R.

CONVENTION NOTES.

Are you going to the Convention? Is a question that every brickmaker in the land should answer in the affirmative unless prevented by unsurmountable difficulties.

From every direction comes the good news that the craft is alive to the importance of the coming annual gathering, and there is every reason to believe that the attendance will be very large—much larger than ever before.

We have much sympathy for all craftsmen who are unable to be in Philadelphia, Dec. 10th, 11th and 12th, when the brethren will once more meet together and commune for mutual profit and pleasure. All who can come will surely harvest a rich store of both. No enterprising brickmaker can afford to miss the fourth annual convention of the National Brick Manufacturers' Association.

We confidently anticipate the pleasure of seeing many charter members at Philadelphia. Indeed we will be grievously disappointed if we do not feel the warm hand grasp and fraternal greeting of a majority of those who first wore the National Association's badge in Cincinnati, in 1886. Come all who can and partake of the fruit from the tree of knowledge then planted. Come, and wear upon your breast that emblem of honor, a charter member's badge.

NEW INVENTIONS.

The following is a list of patents appertaining to brick, tile, terra cotta, sewer pipe, pottery, etc., and the machinery used in their manufacture, issued since our last number:

- 412,399. Brick Kiln—F. P. Meyenberg, Chicago, Ill.
- 412,230. Machine for Repressing Brick—Baird & Cornell, Thetford, Ont., Can.
- 412,321. Clay Reducer—W. Burkman, Los Angeles, Cal.
- 412,127. Composition for Base Brick—E. Bertrand, Kladuo, Bohemia, Austria.
- 412,858. Brick Wall—J. McMurty, Lexington, Ky.
- 413,482. Brick Yard Cultivator—A. J. Bates, Summundaewot, Kansas.
- 413,358. Burning Clay for Ballast—W. F. H. G. Butler, Kenosha, Wis.
- 413,170. Stoneware Pipe Coupling—H. B. Camp, Cuyahoga Falls, Ohio.
- 413,388. Pulverizing Machine—W. H. Howard Bath Co., England.
- 414,329. Brick Sanding Machine—Leonard Roll, Wilkesbarre, Pa.
- 414,716. Terra Cotta Construction—John Lynch, Washington, D. C.
- 414,719. Tile—Adolph Metzner—Hamilton, O.
- 415,407. Rack for Drying Brick—James Dennis, Newington, Conn.

- 415,482. Brick Kiln—John H. Thissen and Millard M. Arnold, Omaha, Neb.
- 415,270. Brick Machine—Charles H. Horton, Wellington, O.
- 415,642. Building Block or Brick—Arthur J. Judge, St. Louis, Mo.
- 415,773. Brick—George M. Fiske, Newton, Mass.
- 414,055. Brick Machine—Lewis B. Kennedy, St. Louis, Mo.
- 413,834. Detachable Head for Brick or Tile Machines—Edmund Rothwell, Little Falls, Minn.
- 413,897. Brick for Furnaces—Virgil W. Blanchard, New York, N. Y.

NEW ADVERTISEMENTS.

- Fletcher & Thomas,
Brick Makers' Supplies.
- Chambers Bros. & Co.,
Brick Machinery.
- H. Brewer & Co.,
Clay Working Machinery.
- Geo. W. Sharer,
Brick Driers and Kilns.
- Chisholm, Boyd & White,
Dry Press Machinery.
- I. & M. Wolff & Coleman,
Brick Driers.
- Fate & Freese,
Brick and Tile Machinery.
- Nolan, Madden & Co.,
Clay Working Machinery.
- A. H. Newton,
Brick Mould Sander.
- Jonathan Creager & Sons,
Brick Machinery.
- National Barrow & Truck Co.,
Brick & Tile Trucks, Barrows, &c.
- Wellington Machine Co.,
Brick Machinery.
- Aerated Fuel Co.—Method of Burning
Brick, Etc., with Oil.
- Small Ads., "For Sale, Wanted, Etc."

The Winkle Terra Cotta Co., St. Louis, Mo., has been incorporated. Capital, \$40,000.

Salt Lake City, Utah, is thought to be a fine point for the location of a brick plant of large capacity. The demand for brick is much greater than the supply.

The Art Tile Works in Chelsea, formerly owned by John F. and John G. Low, have passed into the hands of a corporation composed of twenty-four gentlemen interested in the manufacture of tiles.

CAME TOO LATE.

We expected to continue our "Brick Yard Sketches" and give, in this issue, descriptions and illustrations of several prominent yards but the engraver disappointed us, the cuts not arriving till our "forms" were "made up." They are now on hand, however, and will be laid before our readers in a subsequent issue.

TO FLORIDA.

Commencing Monday, December 2, the Pennsylvania Line (S. M. & I. R.R.) with its train leaving Indianapolis at 7-35 a.m., makes direct connection at Louisville with the L. & N. fast train which arrives at Jacksonville, Fla., 1:55 p.m., the following day. Pullman sleeping cars are run through from Louisville to Jacksonville. Therefore, the only change of cars necessary is at Louisville, and that is made without hardship or annoyance.

For tickets and for further information, call at Pennsylvania ticket office, corner Washington and Illinois streets, or ticket office Union Station, or address

H. R. DERING,
Ass't Gen. Pass. Ag't Pennsylvania Lines,
Indianapolis, Indiana.

OUR 1889 CATALOGUE

Is in Printer's hands. Parties desirous of obtaining same will please forward their address at once to insure

prompt mailing. Address,

Link-Belt Machinery Co.,

CHICAGO & MINNEAPOLIS,

---OR---

Link-Belt Engineering Co.,

NICETOWN, PHILADELPHIA, PA., &

49 DEY ST., NEW YORK, N. Y.

[Mention the Clay-Worker].

THE CLAYWORKER.

VOL. XV.

INDIANAPOLIS, IND., JANUARY, 1891.

No. 1

Written for the Clay-Worker.

EXAMPLES OF AMERICAN BRICK AND TERRA COTTA WORK.

No. 34.

LORRAINE BLOCK, INDIANAPOLIS.

The subject of this sketch is one of the handsomest commercial structures erected in this city during the past decade, and shows what may be done with ornamental brick and terra cotta work at moderate cost. The architect has succeeded admirably in combining ordinary pressed or molded brick with terra cotta, which, though not elaborate, is sufficiently rich and ornamental to give the building an ornate appearance. It often happens that the owner of a building is particularly anxious to have an imposing structure but is not disposed to put the necessary amount of money into it to produce the desired result. It requires great skill on the part of the architect to design a building under such conditions that will not present a tawdry appearance. In this instance the architects, R. P. Daggett & Co., Indianapolis, were equal to the occasion and have produced a good brick structure of pleasing appearance, apparently for a reasonable sum of money.

The structure occupies the site of the old State buildings at the corner of Washington and Tennessee Streets and faces the State capitol, a cut of which is also given in this issue. There is a pas-

senger elevator which runs from the basement to the fourth floor and while the entire building is heated by steam any room can be heated separately by natural gas. It is lighted throughout by electricity though any tenant desiring to do so can use gas, either artificial or natural, for illuminating purposes.

More than a million brick were used in the walls of the building. The ornamental pressed brick were made by the Chicago-Anderson Pressed Brick Co., and

N. Y., have been especially active, a 500 horse-power dynamo having been erected at the latter place for the aluminum manufacture in 1886. And yet so difficult has been its production that five years ago its price was quoted in troy ounces at from 75 cents to \$1.25 per ounce, although within the past year or two it has been sold at \$3 to \$4.50 per pound. Now, however, Mr. Eugene H. Cowles claims to have discovered a new process for the cheap extraction of this

metal from common clay. According to the *New York Times* he says:

"We now expect to offer a pure metal made by a new process that is radically different from anything yet known to metallurgists—a process that is ridiculously simple in operation and almost theoretically perfect. By reason of two chemical discoveries it is found that the pure metal can be extracted direct from the clay. This can be done without the use of electrical heat.

When operated

on as large a scale as that on which iron is produced, aluminum will be produced at a cost permitting it to sell at \$200 per ton, a price less than the present price of copper. Alterations will be made immediately in our works at Lockport to make the metal on a large scale. Capitalists in New York are preparing to build immense new works of probably twenty times the capacity of the Lockport works. One of the large plants will undoubtedly be at Niagara Falls, where



LORRAINE BLOCK, INDIANAPOLIS, INDIANA.
R. P. Daggett & Co., Architects.

the terra cotta by the Indianapolis Terra Cotta Co.

PROGRESS OF ALUMINUM.

Since 1885 the efforts made to cheapen the cost of aluminum have been especially earnest among the metallurgists and chemists, both in this country and abroad. In this work Mr. H. Y. Castner, of New York, and Messrs. Cowles, of the Cowles Electric Smelting and Aluminum Company, of Cleveland O., and Lockport,

10,000 to 12,000 horse power will be required to operate it."

It is to be hoped these expectations will be realized, and if so aluminum is likely soon to occupy a highly important position in the arts, some of which it probably will revolutionize.

The metal has a specific gravity of 2.58, a cubic foot of silver weighing four times as much, and a cubic foot of iron or steel three times as much as a cubic foot of aluminum. It is of sensibly the same color as silver, oxidizes but slightly in air, water has no action on it, nor is it attacked by nitric acid or dilute sulphuric acid or sulphureted hydrogen. From its extreme lightness, strength, and resistance to tarnish, it is used to a considerable extent in the manufacture of dental, surgical, optical, electrical and scientific instruments of various kinds. It is very malleable and ductile, and may be readily beaten and rolled into thin sheets or drawn into fine wire. It melts at a temperature higher than that of zinc and lower than that of silver, has a tensile strength of 25,000 to 30,000 pounds per square inch. Among its uses heretofore have been as an alloy of copper, making aluminum bronze, also in small percentages as an alloy of iron and steel, with remarkable advantages.—*Ex.*

Written for the Clay-Worker.

PRESSED BRICK FOR FINE FRONTS.

No. 2

BY H. BRIN.



The first thing necessary in starting the manufacture of fine pressed brick is to have a suitable building large enough to do all the necessary work without crowding or confusion. This building should have a floor arranged so it can be heated with a moderate heat, either with exhaust steam or a hot floor with furnace heat. We prefer a steam heated floor, as the drying of the brick is slower and more satisfactory, not so much danger from fire and is equable; one part of the floor is equally as hot as any other part of it.

The clay mixing and tempering must be arranged for, with an ample soak pit to hold enough clay, or more than enough, for a day's task. Have the soak pit convenient to the pug mill and a water supply convenient to both, provided with a short hose so the clay can be put to soak as it is brought in. The proper tempering of clay is a difficult matter as

the clay is always subject to the state of the weather, and is more or less wet or dry in the bank.

The remark of the laborer at the pug mill, was to the effect that he could enter college and graduate with honors in all departments quicker and easier than he could learn to temper clay so it would be uniformly alike each day.

After the clay has been pugged it can then pass either to the machine, which should be a soft mud machine, or wheeled to the tables of the hand molders. In either case, the bricks after being molded are dumped on the hot floor and remain there until they are well set, or hardened sufficient to be taken to the repress. As soon as they reach this stage of dryness, they are taken up singly and brushed off lightly and rapidly, going over the whole six faces of the glut with a light scrubbing brush or a stiff horse brush, without making finger marks or breaking the corners of the gluts.

The whole day's make of gluts is now hacked up with a task to each repress, and covered with a canvass, or old carpet or burlap sacking or some such material and a dash of water thrown over it on all sides with a sprinkling pot enough to just dampen the canvass or covering. This will allow the pile of gluts to become moistened throughout in an equal degree, as when drying begins, the corners and angles of the glut will be dryer than the faces and the inside of the glut more moist than the outside.

The repress is now taken to the pile of gluts, as the position of the repress must change each day as the floor is filled with the pressed brick, beginning at one end and working directly across the floor in regular order.

One man and two boys will constitute a force at the repress to perform the task of repressing and placing on the floor to dry two thousand five hundred bricks. One boy will take the gluts from the pile and place them in a tub or box of fine sand prepared for the purpose and will rub the glut quickly, lightly and evenly on its ends and faces with the dry dust, and place it on the table of the repress.

Each glut is calculated to contain an equal amount of clay and the proper amount of moisture, but the state of the weather or other causes may be such as will cause the pile of gluts to be slightly dry. In this case, the pressure must be applied heavier, or if the glut is soft, a pressure made lighter, or the clay will be forced out of the mold box around the follower at top or bottom; so it requires

a man of judgment to operate the repress. In the first case, if there is lack of pressure, the brick will remain rough or will warp in drying and is slightly thicker. In the latter case, if too soft and clay is forced out of the glut, the brick will be too thin and the mortar joint will deviate from a straight line when laid in the wall with bricks made from dry gluts.

The brick is taken from the follower of the repress by another boy and is handled between two thin paddles of wood or plates of iron or steel made especially for the purpose and are laid upon the floor on their flat sides, piled directly on top of each other until they are eight bricks in height. The floor must be made perfectly level, with a fine sand spread thinly to prevent their cracking on the lower courses, the sand to be the same as that used to coat the gluts before repressing. The bricks are placed at equal distances apart on the floor to make the circulation of air even about them, as if the spaces are greater on one side the brick will dry faster on that side and cause it to warp and be crooked on that face or cracked on the other face opposite. The bricks remain here till perfectly dry, then taken up singly and again perfectly brushed and rubbed and put in hacks or tiers so as to be convenient to the wheelers, or they can be placed on pallets and stacked up in tiers.

They are taken from here to the kiln by the wheelers either on barrows, trucks, or carried there on the pallets on their shoulders; if on trucks, they are left on the pallets and placed on the trucks which are provided with springs. If barrows are used they should have springs also and a pad interposed between tiers of a coarse wool horse blanket divided lengthwise in two pieces and folded so as to come between each tier of bricks with a light pallet of wood six inches wide and a quarter inch in thickness on top of the blanket between courses. This is to prevent jar or jolt in carrying them to the kiln. The runways for the barrows should be made of 2x10-inch pine joist laid lengthwise and made solid, and kept clean of dirt and rubbish.

The Idle Bee.

Now doth the little busy bee
Refrain from doing work,
For through the winter season she
Lives like a royal Turk.
She dines on dainties rare and sweet
And loafs her time away;
From now till spring she'll simply eat
Her three square meals a day.

A WINTER SONG.

THE winds are whistling through the trees,
The snow is falling fast,
The brooks upon the mountain side
No longer over mosses glide;
The laughing rill upon the hill
Under a spotless robe is still;
The summer days have passed!

The frost has clad the naked bush;
The pine trees sigh and moan;
The winding road is lost in snow;
The birds of winter come and go,
The woods are dumb, the wild bee's hum
No more from blooming flowers will come—
Till winter days have flown!

Sing out a ringing roundelay!
Be merry while ye may!
What tho' the winds are wild and cold—
What tho' the year is growing old?
If hearts are warm and love is strong,
The moaning wind in summer's song,
So love and laugh to-day!

Henry Ripley, Dorr, in *Home Journal*.

Written for the Clay-Worker.

WHAT BRICK MACHINE WOULD YOU RECOMMEND?

BY J. W. CRARY, SR.

The above question is very often put to me in letters, the writers of which, do me the honor to think I can wisely answer this, as well as all other queries about "brickmaking and burning." I thought when I wrote my book on the subject, that I had at least indicated the best brick machines to be used for certain kinds of clay, but it seems that it requires "precept upon precept, line upon line, here a little, and there a little." One writer says, "I was much pleased and edified by a personal perusal of your book; but why did you not point out the best brick machine?" A moment's reflection would have saved my good friend the trouble of this question. If he had a brick machine on the market, and I had recommended some other machine than his, he would have seen that I had acted very unwisely by making such invidious distinctions. In former papers in the CLAY-WORKER I have classified clay, and brick machines, and shown that certain kinds of clay are best adapted to certain processes of manufacture. If a person, or party, desires to use a *dry press* brick machine successfully, a bed of clay *homogeneous* in nature and kind, and comparatively dry, and strong, and plastic when wet and tempered, is the best. Such clay would be about half sand, the balance alumina, with certain metallic oxides, and, perhaps, alkalis, and would be easily pulverized and combined.

Thorough pulverization and amalgamation is absolutely essential in preparing clay for a dry press machine. *Crystallization* and *cohesive attraction* or press-

ure, are the only known forces by which clay can be formed into shapes of any sort, and while these two forces act inversely, the result is the same in effect. But in either case, the best results are only had by perfect comminution and co-mixing. If certain parts of a dry pressed brick contains more sand than other parts, such brick is weak and friable. To make a perfect dry pressed brick, the clay must be reduced to an impalpable powder, and thoroughly mingled.

WET PLASTIC CLAY BEDS NOT GOOD FOR DRY PRESSED BRICK.

If a clay bed be wet and soft, a dry press machine will not pay, because the clay must be taken out and dried before it can be pulverized. This would cost as much as it would to temper it for a soft mud or stiff clay machine. So it is evident that a brick machine must be adapted to the clay bed, and not the clay bed to the brick machine. If a clay bed be suitable for a dry press machine it can be worked cheaper and with more profit in winter by such machine, than with either soft or semi-soft clay machine.

A large amount of clay can be put under a shed for a dry press, and it can be used in winter as well as in summer, for if the clay be full of frost when pulverized and pressed, *thawing* will not affect the brick, and a kiln of frozen dry pressed clay, would burn just as safely and well, as if no frost had been in the clay. I say this from actual experiment.

THE DRY PRESS BRICK MACHINE FOR PROFITABLE WORK.

Brick machinery is entirely different from all other machinery in its liability to *wear* and *strain*. However ingenious and perfect the workmanship may be, there must necessarily be great exposure to abrasion, and the replacing of worn out parts, is not only a big tax in *cash*, but it is attended with much incidental loss in time and imperfect work. It is, therefore, of primary importance in the construction of brick machinery, to avoid all contact of the working parts of such machines with clay, and dust, and to simplify the machine as much as is consistent with its efficiency, so that its operating parts will be reduced in number to a minimum. I have not closely examined the many brick machines now in use and on the market, and I could not give a correct and reliable opinion in respect to their merits. While the *plunger*, or direct pressure principle, seems to be the only one employed for dry press machines, yet the *roller* princi-

ple is the most simple and durable, and can be constructed so as to exceed in capacity and economy, any of the *plunger* machines, though there are many excellent machines of the latter class.

The distinctive difference between the *roller* and *plunger* or direct pressure machines, is, that a press roller presents a certain fixed angle of pressure to the *dies* for brick, which are filled and covered with much more clay than is needed, and the *press roller* gathers a certain, invariable, and needed quantity of clay, as it impinges on the surface of the molds, and fills them with exact uniform pressure, carrying a little surplus forward, so that every *die* is filled alike with the same weight of clay, besides the air is all expelled as the *roller* exerts its greatest pressure only on one part of the brick at a time. Now, by the *plunger* process the *molds* are all filled even, with loose dry clay, and though the measure may be exactly the same in each *mold*, yet the weight will be different, because it is impossible to *pack* loose dry clay alike into any given space, by any automatic device, there will be a difference in weight of from one to three ounces. Now it is evident, that when the plungers come in the *dies* they meet with unequal resistance and strain, besides, if they act quickly, there is no way for all the air in the clay to escape. If springs are used to relieve a machine from unequal pressure, and excessive strain, then the brick would vary in size and density. So that I would advise the use of that kind of *dry press* brick machines, which have the fewest wearing parts, and best protected from *dirt* and the most perfect way for filling the *dies* with an even, uniform weight of clay. I believe these needs have been pretty well supplied by many of the *dry press* machines. I have not examined the latest machines, and could not make a selection properly for myself, much less advise my questioners on this part of the subject. There are so many improvements in the making and burning of brick it would be best for anyone that decides to establish a brick *plant*, to visit the places where most of the prominent *machines* and *kilns* are operating; taking careful notes as they examine each place. It would be much wiser and better to spend \$1,000 and six months time in making a thorough investigation by traveling to see the improvements advertised, in full operation, taking care, if you are not an expert yourself, to get some reliable expert in brickmaking and burning, and a good

judge of machinery to go along with you.

BRICKMAKING IS THE BUSINESS IN THE WORLD TO GO SLOW AT.

It will always pay to buy good reliable skill, advice, and information at any fair price, in any good enterprise, but in brickmaking it is indispensably necessary if you desire to establish the business with certain success.

So far as experimental tests of samples of clay, and its adaptation to certain processes of manufacture is concerned, I will say to all those who desire to get my aid or advice, I will cheerfully answer queries, on paper, for the good it may do the *craft*, without charge or fee, but if specimens of clay are to be tested, and my opinion and advice given, as to their use and value, etc., I must charge a reasonable price for my skill and trouble. I do not ask for this work, but there are so many asking for it, I am compelled to do it, as long as I can serve the *craft*.

Written for the Clay-Worker.

HINTS ON BRICKMAKING.

No. 52.

BY "R. BRICK."

SOME ADVICE.

At this time of the year, when nearly all brick works are closed for the season, the brick manufacturer should perfect his plans for the coming year's work.

First, if there are any improvements contemplated they should be under way as soon as possible. Engine, boilers, machines, shafting, pulleys, pumps, etc., should be carefully inspected, broken or worn parts renewed. Try the plumb, level and square on machines and shafting; not only repair broken parts, but, if possible, anticipate any probable breakage in future by renewing that which is worn or weakened. One day in the midst of the busy season is of more value than six days when the works are idle in winter. If a machine is not plumb the ground sills may be rotted, if so, put in new sills on good brick walls. Nothing equals a good brick wall to support heavy machinery. If you find from past experience that any part of your machinery breaks frequently, have this particular piece made stronger, and put all in good order, then next season keep the cogs clear of mud and well greased, journals oiled, and all bolts tight and cog gear in line. When you hear any unusual noise about the gearing find the cause and remedy it at once. This will save many expensive

breaks. All brick machines should be arranged so that when any part breaks the machine can be stopped instantly, independent of the engine. This can be done by clutch and lever, or by having an idler to tighten the belt; this is held in place against the lower side of the belt and keeps it "taut." A rope leads from the idler frame to the man at the machine; by a pull on the rope the idler drops, the belt is slackened, and the machine is stopped. If you are running your machine without any protection from stones or iron that may be in the clay, get a crusher or disintegrator. This will not only protect your machine and prevent breakage but will also prepare the clay for more thorough grinding and produce better bricks, better in shape, better in finish and stronger than before.

HOW TO DRY BRICK.

After this part or department has been put in proper shape the next question is the drying of the bricks—how they can be dried to the best advantage or to the greatest profit. First, however, when you dry them, make sure of this point, that there be *no loss* or waste in the drying, for every thousand that is made at the machine one thousand should go into the kiln. There should be no loss at this point. It follows then, that they must not be dried without a roof over them, at least in a country where there is rainfall. They must be housed or there will be loss, and great loss, sometimes. By drying under roof the bricks are saved, but this does not assure a steady output if there is continued rain. The machine must remain idle a part of the time. The manufacturer does not control his production. This is a source of annoyance and many times heavy losses. Then to be in control of his daily output he must not only have a dryer that will save the brick but one that will dry them in a given time. Such a dryer must have artificial heat. When a dryer of this kind is used there is steady and reliable daily output, the manufacturer can now make his contracts for future delivery without any fears of daily forfeits if the bricks are not delivered within a given time. He can make more bricks per annum within a daily capacity of twenty-five thousand brick, than he could make without a dryer with a daily capacity of fifty thousand bricks. True, it costs something for fuel to dry the bricks; the cost varies from twenty-five cents per thousand to fifty cents, dependent on the cost of fuel, but there is a

saving in the handling of bricks, and the comparatively small area occupied by an artificial dryer, saving the moving of bricks long distances from machine to yard, and thence to the kilns. It amounts to an insurance on your bricks that is worth something, so that in reality it costs you less to dry by artificial than by natural heat. After many years experience in making and drying bricks, by both natural and artificial heat I am free to say, that I would prefer to dry bricks by the latter, if the fuel cost one dollar per thousand bricks.

There are but two principles of drying by artificial heat, the one by placing the bricks in contact with a heated surface, the bricks absorbing the heat, and in this way expelling the moisture; the other is to place the brick in open order on cars, in a tunnel, where currents of hot air come in contact with them, the brick absorbs the heat and the atmosphere the moisture. The great difficulty in the tunnel system is to utilize all the heat, the air currents move more freely between the surface bricks and the walls of the tunnel than they do among the bricks. The bricks on the outside of the load dry first, then while those in the center are drying a large portion of the hot air is coming in contact only with dry bricks, and passes off without its load of moisture. If this could be remedied the tunnel system would be far the most economical to operate, both for fuel and labor of handling brick from machine to kilns. The hot floor dryer utilizes all the heat except that which escapes through the smoke stacks. If properly constructed, however, the distance from the generating furnaces to the smoke stacks can be from one hundred and fifty to two hundred feet, before it escapes, where in a tunnel dryer the distance between furnaces and smoke stacks is from sixty to ninety feet.

Each brickmaker should investigate the merits of the various methods and adopt that which best suits his location, clay and capital, but get a dryer of some kind and save your product and control your output. Be not at the mercy of winds and rain like a mariner adrift without sail, rudder, or compass.

The question of burning will be considered in a future article. This season of the year is the proper one to contract for a fuel supply for the coming season, whether the fuel is to be wood, coal, oil, or gas. By contracting for a large quantity, it can be bought at better rates. Fuel, next to labor, is the most important item of expense, and is worthy of much thought and attention.

THE HOOSIER CAPITAL.

Indianapolis is a city of conventions. There is scarcely a day in the year that does not find an associational gathering of some sort going on within our borders. Its central location and great railroad facilities have made this a very popular city for holding national conventions. There is no wall about our city, not even a fence. The stranger is always taken in and given the freedom of the town, which covers twenty-five square miles. There is no need of any visitor going away empty and dissatisfied. If they will but ask for what they want—and have the price—it will be forthcoming at once. Hoosier hospitality is no unmeaning phrase, as all who come to the National Brick Manufacturers' Convention will discover. We sincerely hope that every craftsman who can will meet with us on the 20th inst. There is room and a warm welcome for all both great and small. The timid brethren from the shores of the Atlantic need have no fears. There are no Indians here (except those in front of the cigar stores) or dangerous characters of any sort. The natives are all mild and gentle of demeanor and we have an efficient metropolitan police force capable of taking care of any and all unfriendly intruders.

There is every reason why craftsmen generally should come to the convention and those who fail to do so will miss a

rare treat. We will have many things to show our visitors. The State Legislature will be in session and all who wish may look upon that famous body free of charge.

OUR STATE HOUSE

is an honestly built structure. No one can gainsay this. To look at the beau-

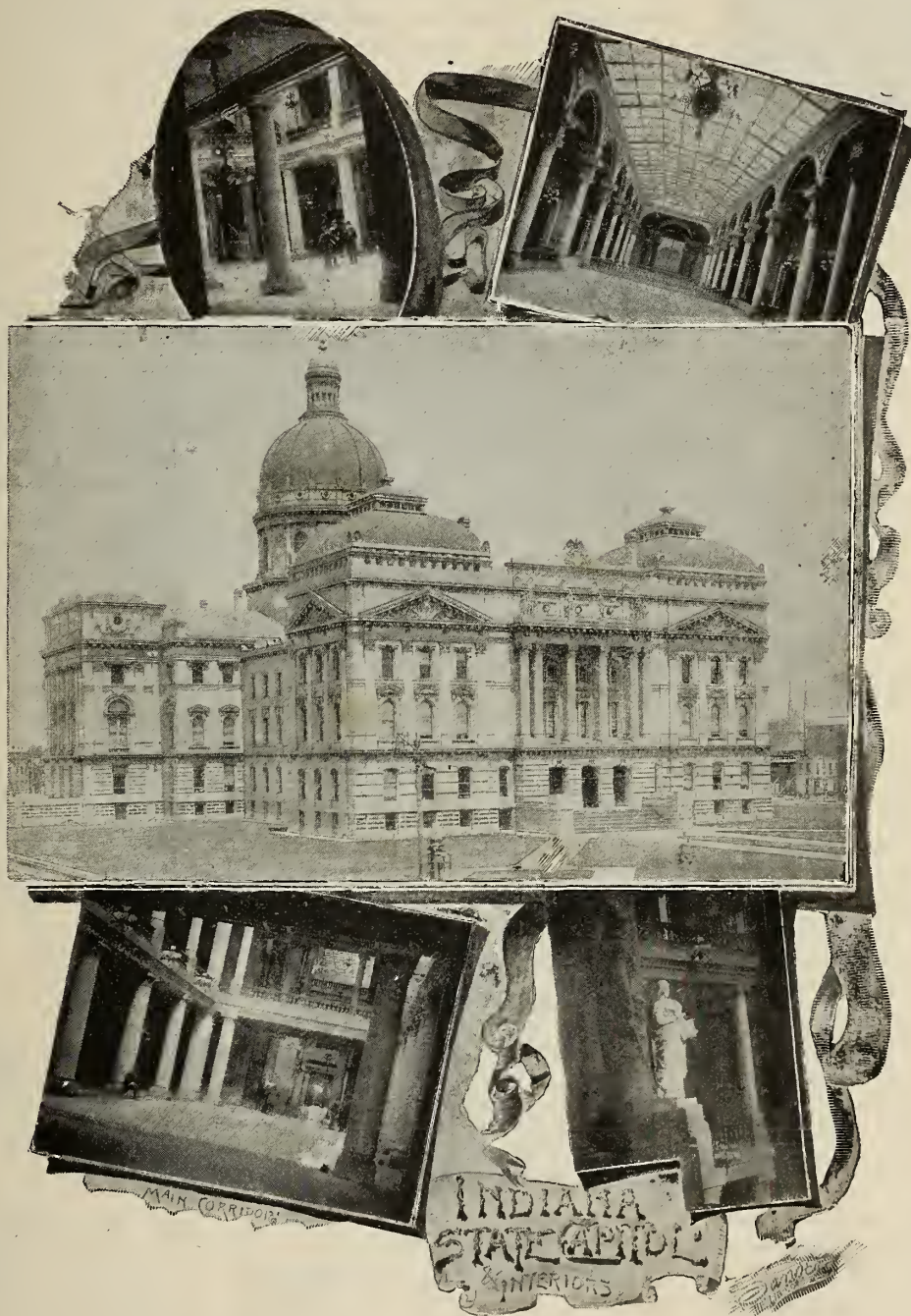
There is not a large use of wood in any part of the structure. There are many attractive features about the building, notably the Senate Chamber and that of the House of Representatives, the law library, the State library, the Agricultural Bureau, and, most beautiful of all, the splendid corridors, which bring floods of

light into the centre of this great building. There are very few structures in the world that have such a splendid corridor as this one. The ventilating apparatus is well worthy of inspection. It is ingenious and effective. Those in charge will take pains to show it to all interested in such matters. By the way, there is a most beautiful view of the city and surrounding country from the dome. Passage to the stairways leading to it may be secured from Mr. Tim Griffin, the custodian, who is very accommodating and will make it pleasant for any of our friends who will call upon him at his office in the building.

THERE is no doubt that the failures of several large companies engaged in the building trade in New York City are directly traceable to labor troubles—boycotts and the like. It is not to

tiful building and all of its appointments and consider that it was built inside of the original estimate of \$2,000,000 can but call for surprise in these days of over reaching. It is as near fire-proof as a house can be. The floors are made of iron eye beams filled in and surrounded with brick and hollow tile.

the interest of any parties that such failures should result. And the exercise of a little common sense ought to prevent it. In the first place it is idle for capital to assume that labor organizations can be broken down. They have come to stay, and in the main will, in accordance with human nature, grow stronger from



opposition. On the other hand, capital will protect itself by its inherent weight, and, if need be, by organization. Let each recognize the strength and the rights of the other, and strife will cease.—*Ex.*



OFFICIAL ANNOUNCEMENT AND PROGRAMME.

Fifth Annual Meeting of the National Brick Manufacturers' Association, to be held in Indianapolis Jan. 20, 21, 22 & 23, '91.

To the Members of the N. B. M. A.:

GENTLEMEN—As previously announced our next annual gathering will be held in Indianapolis, Ind., Tuesday, Wednesday, Thursday and Friday, January 20, 21, 22 and 23, 1891.

REDUCED RAILROAD RATES have been obtained from all roads composing the Trunk Line Association, the Central Traffic Association and the Southern Passenger Association, which include, nearly if not all, the leading railways in the Eastern, Central, Southern and Western States. Over all these lines a two-thirds rate has been arranged for on the certificate plan.

Each person desiring the excursion rate must purchase a first-class ticket and pay full fare to Indianapolis taking a printed certificate from the ticket agent stating that ticket has been purchased at the regular rate. This when countersigned by the Corresponding Secretary, will entitle the purchaser to return ticket at one-third the regular fare, thus making a two-thirds fare for the round trip.

Should any Station Agent fail to have a blank certificate, a Receipt for the amount paid stating that it is for one first-class fare and bearing the Agent's stamp should be taken, and will enable the Secretary of the Association to obtain the reduced rate returning, which cannot be done if no certificate or receipt is taken.

PLACE OF MEETING.

The Convention will meet in the Board of Trade Hall, corner of Tennessee and Maryland Streets.

HOTEL ACCOMMODATIONS.

The Hotels selected for the accommodation of the delegates, are:

The Grand Hotel, corner Illinois and Maryland Streets, one square east of the Convention Hall. A uniform rate of \$3.00 a day will be made to delegates during the Convention.

The Bates House, corner Washington and Illinois Streets, two squares from Convention Hall. Rates \$3.00 to \$5.00 a day.

The Denison Hotel, corner Pennsylvania and Ohio Streets.. Uniform rate of \$3.00 a day.

The Spencer House, corner Illinois and Louisiana Streets and across the street from the Union Station. Uniform rate of \$2.00 a day.

THE PROGRAMME

of the meeting so far arranged is as follows:

FIRST SESSION, TUESDAY, 2:30 P.M.
Roll Call.

Reports of Officers.
Enrollment of New Members.
President's Annual Address—
T. B. McAvoy, Philadelphia, Pa.
Election of Officers.

1. Essay—"Brick Yard Vernacular,"
S. K. Fletcher, Indianapolis, Ind.

NOTE: At the close of each address or essay, the subject under consideration will be fully discussed.
TUESDAY EVENING, 8:00 P.M.

Third Annual Pow-wow under the auspices of the local brethren.

SECOND SESSION, WEDNESDAY, 9 A.M.

2. Essay—"The Elements of Dry Press Brick Machines," Thad. Smith, St. Louis.
3. Address—"Brickmaking in Alabama,"
J. W. Sibley, Coaldale, Ala.
4. "Burning Dry Press Brick"

Discussion led by—
5. Address—"What, How and Why,"
W. D. Gates, Chicago, Ill.
Announcement of Committees.

THIRD SESSION, WEDNESDAY, 2:30 P.M.

6. Address—"Labor Troubles; How to Avoid Them,"
D. G. Harriman, New York City, N. Y.
7. Essay—"Drying Brick,"
Frank B. McAvoy, Philadelphia, Pa.
8. Address—"The Pallet System; its Advantages and Disadvantages,"
Frank Stiles, North Haven, Conn.
9. Discussion—"The Paving Brick Interests"
Led by R. C. Burton, Zanesville, O.
10. Question Box.

FOURTH SESSION, THURSDAY, 9 A.M.

11. Essay—"Press Brick; Their Manufacture and Use," Wm. Roberts, Trenton, N. J.
12. Address—"The Guthrie Kiln,"
Ellis Lovejoy, Union Furnace, O.
13. Essay—"Drain Tile; its Manufacture and Use,"
E. M. Pike, Chenoa, Ills.
14. "Ornamental Brick,"
Discussion led by—
15. Question Box.

FIFTH SESSION, THURSDAY, 2 P.M.

16. Essay—"Continuous Kilns,"
W. H. Duffet, Beatrice, Neb.
17. Essay—"Manufactured Gas for Burning Brick"
Wm. Waplington, Philadelphia, Pa.
18. "Vitrified Brick,"
Discussion led by—
19. Question Box.
Reports of Committees.
Miscellaneous Business.

FRIDAY, 10 A.M.

Free excursion to Marion, Ind., and other points in the natural gas belt. The Marion Brick Works, one of the finest winter plants in the West will be visited. The works will be in full operation and the craftsmen will have an opportunity of thoroughly investigating the merits of natural gas as a fuel for drying and burning brick.

Members and visitors can have their mail addressed to them in care of the Corresponding Secretary. Each member will be presented with an appropriate badge made of aluminum.

Everyone directly interested in the manufacture and use of brick is eligible to membership and all are invited to attend the Convention which bids fair to be one of the largest gatherings of the craft ever held.

Those who wish to identify themselves with the Association but are unable to be present, can have their names enrolled on the list of membership by addressing the Corresponding Secretary, T. A. Randall, Indianapolis, and remitting \$2.00, the annual membership fee, which will entitle them to a badge and to the full report of the Convention, including all papers, discussions, etc., which will be published in book form.

Respectfully,

THE EXECUTIVE COMMITTEE,

T. B. McAVOY, *President*

T. A. RANDALL, *Cor. Sec'y.*



ARE YOU COMING TO THE CONVENTION?

If you are, and you can't afford to miss it, bring a sample brick with you—burned or green or both. Attach your card to it and state how made. A place will be provided for the display of all specimen brick. If there isn't room for it in your "grip," express it to the Corresponding Secretary, charges prepaid.

DON'T FORGET THE DATE—TUESDAY, JANUARY 20TH.

INDIANAPOLIS.

The Convention City and Home of The Clay-Worker.

Those of our readers who attend the coming annual convention of the N. B. M. A. will find the Hoosier capital a very beautiful city. It is well laid out with broad and especially well shaded streets. We are suffering some from overgrowth and from having had the streets badly torn up two years ago for natural gas trenches. Houses have been built faster than streets could be improved, and while the road beds are not uniformly in good condition the spirit of improvement is abroad and many miles of brick and asphalt pavement will be laid during the year to come. A great deal of beautiful asphalt work has been done, and contracts have been awarded for brick paving in several of our streets. But despite this torn up condition the general effect is beautiful. The lawns and yards are well cared for, the building sites are ample, the architecture generally good, and the result highly satisfactory.

We present some photographic views of a few buildings of interest to brickmakers. We do not pretend to make an exhaustive showing but take the few sketches which are at our command for the purpose of giving a general idea of the character of the work that may be seen by those who care to view our city.

Our Union Station is one of the most beautiful railway stations in the world. It is wonderfully picturesque in outline, fine in detail, good in coloring and of highly novel treatment. It is altogether due to Indianapolis that she should have the finest and most beautiful depot in the world. For many years the citizens and traveling public put up with the ugliest, dirtiest and altogether the foulest and most gloomy structure of its kind that

could possibly be imagined. It was dangerous to pass through, it was crowded, it was reeking with smells and was a miserable place. Now they have the exact opposite and know how to appreciate it. The beautiful entrance hall lighted through the cathedral glass of brilliant hues, the tile floors, the elegantly frescoed walls and ceiling, the rich furnishings, the attractive waiting rooms and the general spirit of good order and convenience which makes itself apparent



to all is manifestly a just heritage for those who suffered from the old structure in years gone by. The view of the depot which we give is one not usually presented. It is taken from the side and somewhat to the rear and shows some of the best brick work though not the most picturesque view. Other views of the building have been repeated from time to time and we select this one partially because of its novelty and the real merit of this part of the building.

THE TABERNACLE CHURCH

which is located on the corner of Second and Meridian Streets, was designed by Mr. Vaux, of New York City. This is a church without a spire. That much of the old cathedral idea is omitted on the outside and on the interior the arrangement is such as is best suited for hearing and seeing for those who attend the services. It is seated on the lecture room plan. The room is not very broad and the floor is dished. Altogether the structure

is planned and designed in a spirit of utilitarianism. It is planned with reference to the uses for which it is intended and like all other buildings of that character the ideal of attractive external and internal appearance is attained. All manufacturers of building materials are interested in seeing the best results from that which they produce, and that with the common idea that anything to be attractive must necessarily be inordinately expensive the ends of artistic attainment are frequently not attempted in the case of moderate cost structures. But here we have a church which was built at a relatively low cost, from common brick and modestly trimmed and decorated with terra cotta, yet no one can gainsay its beauty. It is one in which ordinary material and good sense have combined to bring about good results. There is a very attractive terra cotta fireplace in the main room. It

is an unusual feature yet a very cheerful one which lends a home-like appearance and puts the good people more at ease. We will give a sketch of this fireplace in a subsequent issue

A dispatch sent from Montreal to London, and a reply received, all in thirteen minutes, illustrates how business is conducted at the present time. Contrast this with the not-long-ago of sailing vessels as the quickest medium, and a fair idea of progress is had.—*Ex.*

Written for the Clay-Worker.

BRICK PAVEMENTS.

BY D. W. STOOKEY.

The paving of streets and making of roadways has been taken as one of the indications of the degree of civilization of a people, and to-day it is a problem with which municipalities are occupied. That all are not of the same opinion, even in the cities and towns of the same State is not strange when we consider that their conditions are different. In taking into consideration the matters of economy, durability, health and comfort it is readily understood that one pavement is best suited to one place and another kind to another.

Small cities where property is not valuable enough to justify heavy taxation and where stone is convenient and cheap, might find macadam the most satisfactory pavement for them. In streets of large cities with valuable abutting property and heavy travel, granite, which is durable but expensive, would likely be adopted. In the residence portion of cities of means, where health and comfort, with a limited amount of economy, are to be taken into consideration, the cheap, dusty macadam, and the expensive and noisy granite, would give way to something that possessed the qualities most desired in that particular street.

For this class of work and for the business streets of nearly all of our western cities brick pavements, without a doubt, are best adapted to fill all requirements.

Much of the prejudice against brick pavements, and the doubt as to their durability, is based upon the experience in using common building brick, that were improperly or insufficiently burned, for sidewalks. These were laid flat and without a proper foundation. As a natural consequence they sank and tipped out of line and the softer ones crumbled and wore away, thus making a very uneven surface and showing lack of durability.

With properly burned brick, laid according to the plans adopted in many places during late years, these objections do not obtain. The question of durability has been practically settled, as they have been in use in the United States for from fifteen to seventeen years, with little or no signs of failing, and practically no expense for repairs, while in cities of Holland they have endured the test for more than half a century. The wear upon the surface is very small indeed, amounting practically to almost nothing.

The wear in Bloomington, Ill., as given

by Mr. Bell, the city engineer, was not more than half an inch in twelve or fourteen years.

The even, level surface of brick pavements, is very easy on the horses' feet, and the velvety texture makes them smooth but never slippery. The small distance between the seams also tends to prevent slipping. Many authorities have said that horses never slip on brick pavements. The jolt, shock and wear upon teams and vehicles on granite and cobblestone pavements is entirely wanting on those of brick. The noise is also much less, which is a consideration for residence streets. Brick pavements are claimed by their advocates to be almost as noiseless as any other.

The brick being of a regular, uniform size and shape form a perfect bond, thus supporting each other on the sides and ends.

In laying pavements of any kind, the work of excavating, grading and preparing the roadbed is practically the same. This work varies somewhat with the thickness or depth of the pavement proper but this variation is slight, as the difference in the thickness of various kinds of pavements is so small that it has but little effect upon the excavating or grading necessary. The surface of top of the pavement is the part that is considered in the calculations and the position of the roadbed must necessarily depend upon the thickness of the completed pavement.

The roadbed should be thoroughly underdrained at a depth sufficient to insure safety from being softened by water from springs, spouty places, or standing water from imperfect surface drainage. Solidity of the roadbed is essential to the preservation of an even surface of the paved street, and dryness adds materially to the durability and healthfulness of the pavement.

After being brought to the proper grade the roadbed should be made firm and compact by being thoroughly rolled with a heavy roller weighing several tons. These rules for the preparation of the roadbed are equally applicable to any style of pavement.

The foundation upon which the pavement proper is to be laid is next to be considered and several kinds have been used with satisfactory results. Pavements of brick or burned paving blocks laid directly upon the solidly rolled earth, and having their joints filled with hot asphaltum and sharp sand, have been constructed, and upon a naturally

solid and well drained foundation, will probably give satisfaction for streets with light travel but they are not to be recommended for general use.

Another cheap method which has been adopted in some places with good results, consists in placing a layer of about four inches of sand upon the roadbed, and upon this placing a single course of brick upon edge. The brick are then settled well with heavy mauls or rollers and covered with a course of fine sand well swept into the spaces.

A good foundation of well rolled macadam, upon which is spread about two inches of sand, with a course of brick set upon edge, firmly settled and covered with fine sand, makes another form of pavement that will be found cheaper and probably just as satisfactory in some localities, as the customary style, made of two courses of brick, which will be explained in detail farther on.

Concrete has also been used as a foundation for pavements in some places. In St. Louis, granite blocks and wooden pavements have both been laid with concrete foundations.

The plan generally adopted in the cities of Illinois and other places in the Mississippi valley, is undoubtedly the best, and in the end, the cheapest for laying brick pavements. This, with slight variations as to detail, consists in laying upon a carefully graded and solidly rolled bed a layer of four to six inches of sand. This sand is accurately struck off with a board gauge, shaped to give the grade of the street. Upon this sand a course of common, hard-burned brick is laid lengthwise with the street, with joints broken as in masonry. As these brick do not have to withstand the wear of travel they need not be as hard as the "pavers" of the upper course. They should be well tamped, and settled solidly and level into the sand. Over this course of brick is spread one or two inches of screened sand, smoothed and gauged to the proper form and depth. Then the top course of brick is set upon edge crosswise of the street with joints well broken. The brick of the upper course should be burned very hard and uniformly, to insure durability and uniformity of wear. An inch of fine dry sand is then spread over and well swept into the spaces.

After being rolled several times with a heavy roller the pavement is ready for use. Travel will gradually work the sand into the joints and thus add to the solidity of the pavement and make it

practically water tight, thus greatly facilitating surface drainage. The lower course being laid flat gives better support for the upper by giving a firm foundation and distributing the pressure of the top brick over a greater area. The brick in the upper course at the intersections of the streets should be laid towards the center, so that wheels will not often run lengthwise of the brick.

Creosote, pitch, coal tar and other substances, have been used to fill the spaces and cover the pavement, but the profitableness of their use is questionable. Brick dipped in hot coal tar to make them impervious to water and frost have been used for paving stables. Several patents have been taken out for brick of different forms, brick and boards, brick with cements, tars and dressings of various kinds in combination, and some cities have laid pavements under patents, but probably the best, as is often the case in other things, is the common way not patented.

All things considered, no size or form of paving brick is as good as the common building brick. The advantages in favor of this size and form are the ease with which they can be made, and the readiness with which they can be obtained, since all brickmakers are prepared for making them; the ease in making repairs, since brick of the proper size and form can always be easily found; and the fact that soft brick that are unfit for paving can be sold for building purposes, thus cheapening the cost of the paving brick.

Large paving brick or blocks are objectionable because they are more difficult to manufacture, and hence more expensive; they are more liable to tip and give an uneven surface; and because the distance between the joints is greater, and thus increasing the tendency of horses to slip.

The city engineers of Peoria and Bloomington, Ill., Burlington, Ia., and other places, as well as business men and property owners, have freely given testimony in such words as these: "The citizens are highly pleased with brick pavements." "It is the best pavement that has so far been introduced for our use, and we have tried wooden blocks, stone, macadam and asphaltum."

George F. Wightman, city engineer of Peoria, Ill., said: "We have in brick pavements the combined good qualities of the granite block, the macadam, the Ashlar, the cedar block, the cobble stone, the gravel and the asphalt, with-

out a single one of their objectionable features, and this, too, at a cost only a trifle in advance of the cheapest pavement named."

While the most durable pavement is granite, the smoothest and, from a strictly sanitary point of view, the best is asphalt, the expense of these two is too great, excepting for large and wealthy cities. A stone pavement is too rough and noisy for residence streets, while wooden pavements, because of their want of durability and unsanitary conditions are not to be considered at all.

Written for the Clay-Worker.

BURNING BRICK.

BY VERBLENDER.

I am told that there is still a demand for more information upon the subject of burning brick; that notwithstanding the able and exhaustive articles that have been running in the columns of "our journal" for the past two or three years, by some of the veterans of modern brickmaking; that notwithstanding the fact that one or more brick kilns are patented every month, the inventors (?) of which are anxious, in consideration of a few hundred dollars in advance, to give instructions which are guaranteed to produce any desired results; that within sight of all these vast fountains of knowledge there are some still thirsting, still seeking for a path that will lead to more successful burns, to a larger percentage of first grade brick. Now, I am not so presumptuous as to undertake to offer anything new upon this subject, nor to suggest any practice contrary to established methods; nor do I propose to tell what I have read upon fuels and combustion, molecules and heat units, oxygen and carbon dioxide. My object is solely to meet the demand for more reading matter upon this ever vital question, and I expect every loyal member of the craft to follow closely. For my part I read everything I see upon this subject, and, though, generally speaking, I am none the wiser for what I read, yet reading stimulates thought, and thinking, definite, continuous, logical thinking, is one of the most profitable occupations for the mind of the progressive brickmaker. I wish to remark, however, that I belong to that stupid class of amateur brick burners who find the directions laid down for our guidance by these authorities, very indefinite and unsatisfactory. Moreover, even the best burners with whom I have

conversed do not seem to be able to explain intelligently how they get their results, and, realizing how vague and unsystematized their knowledge is, they end by telling you that it can only be learned by experience. As this is the only way fools can learn I suppose I ought to be satisfied.

Is it possible that so little is definitely known of one of the oldest and most useful arts? Can the skillful brick burner of to-day get no better results than the skillful burner did two thousand years ago? Does anyone believe that the "Old Romans," the form of whose brick we are now imitating, turned out any worse kilns of brick than it is possible to see to-day in many parts of our enlightened country? Why is it then that brick burning has not advanced with the other arts? The reason is doubtless to be found in the fact that the burning of brick has generally been in the hands of an ignorant, unlettered set of men whose experience has not been recorded and whose skill has therefore not survived them. Now, however, owing largely to the influence of trade journals, a new era is dawning for the brickmaking industry. Practical men are induced to publish a record of their experience, and scientific men to explain the laws which govern all their operations. So that not a little of the success of the American brickmaker to-day is due to a careful study of the columns of the CLAY-WORKER, and, far be it from me to attempt to belittle the efforts of those men, who month after month, kindly give us the lessons they have learned at the fires of the brick kiln. When I express dissatisfaction with their vague and indefinite statements it is not to condemn the writers, but to encourage them to renewed efforts to give us something more tangible, something that will shorten the time of our apprenticeship and make us masters of our art.

WHAT WE WANT TO KNOW.

Realizing that the two essential conditions of successful burning are, first, the requisite amount of *heat*, and, second, *draft* enough to carry this heat to any part of the kiln, we want you to tell us, in exact figures, what temperature and what draft to apply to our kilns during every twelve hours, or shorter period, from the time the fires are started until the kiln is closed. I think I hear some one say that it is not possible to do this. Ought not the history of brick-making, not burning, for the past fifty years give you more confidence in the

possibilities of your art? I maintain that such directions are not only possible, but practicable.

Instruments for measuring the *draft*, similar to those used with such success on all of the kilns of the St. Louis Hydraulic Press Brick Co., are in common use by the brickmakers of Europe and can be obtained at a moderate price.

To use these draft measurers conveniently and accurately, one should have a down-draft (or up and down-draft combined) kiln with a single flue leading to a high stack—which every wise brick-maker has if he can afford it.

The exact determination of the *temperature* of a kiln from the beginning of firing through all degrees of heat applied to effect the chemical reactions necessary to produce from clay a durable and handsome brick, is a problem that has not long been satisfactorily solved. The lower temperatures applied during the watersmoking and until the heat has reached about 600° Fahrenheit, are easily obtained with a mercury thermometer. For the higher temperatures, however, when the brick in the kiln have become incandescent, no reliable and practicable instrument has, to my knowledge, been employed in any country until the past year. In fact, I suppose that the writer is the first, if not the only, brick burner to measure in a precise manner, independent of all causes of error, the temperature of burning brick.

As a result of the observation of the color of incandescent objects, it is well known that as the temperature rises the color passes from dark red to light red, then successively through the shades of yellow-red, orange, pale yellow, and at last to white. We have here a gamut of colors well known to all observers, for which Pouiller has given in his scale the thermometric degrees corresponding thereto. These colors furnish a most characteristic indication of the variations of temperature; but it is impossible to determine these delicate tones of color with accuracy by direct observation, since the "personal error" cannot be completely eliminated. Moreover, the eye is not able to appreciate the shades of color with sufficient definiteness, and is able to judge only by comparison; dark red appears as a light red in an obscure medium, and light red will appear dark in a very clear medium; and this shows the necessity of an instrument which will register correctly without being influenced by the surrounding medium.

Such has been the starting point of many instruments made to register high temperatures, by the well-known phenomenon of color; but, unfortunately, they have not given satisfactory results. The photometers of Crova, Transine, and Violle, are more suitable for the laboratory than for rough usage in furnaces and kilns.

THE PYROMETER, however, which I am using, furnishes a solution of the problem, by permitting an exact appreciation of the color of the incandescent body. The apparatus is portable, not easily

broken, simple, and, thanks to the mode of construction, precise in its indications, no matter what the surrounding conditions may be. Based upon the application of the phenomenon known as rotary polarization, it comprehends essentially two Nicol prisms, one a polarizer, the other an analyzer, of which the principal sections describe an angle of 90°. Between these two prisms there is a plate of quartz. It is known as it passes through the first prism, the ordinary ray is polarized in a plane defined by the axis of the polarizer, and is completely extinguished in traversing the second prism, the axis of which is perpendicular to the first. The plate of interposed quartz, cleaved perpendicularly to the axis, has the object, on the other hand, of deflecting the plane of polarization, which becomes oblique to the principal section of the analyzer, and is able then to traverse it without being completely extinguished.

By the law discovered by Bot, the angle of deviation is proportional to thickness of the plate of quartz, and in consequence, inversely proportional to the square of the length of the wave, as the length of the wave varies with the color, which itself depends upon the respective proportions of the simple rays of light transmitted in the ordinary ray; and if we have the means of measuring this deviation, it is obvious that we are able to decide immediately the temperature from the color of the incandescent body. To effect this, the analyzer is movable in the interior of the tube, in order to bring the principal section to make a certain angle with the polarizer. An index shows upon a graduated scale the angle of deviation, of which zero corresponds to complete extinction.

If, when looking at the incandescent body, the analyzer is slowly turned, the observer will perceive the light under a determined tint, variable with the temperature, and this tint disappears by an angle of corresponding rotation; it is, then, this angle which serves to define the observed temperature.

Generally, there is selected for observation a determined tint that can be easily distinguished. One may readily observe that, by a very slight rotation of the analyzer, the tint perceived passes rapidly from green to red, and, between these two complimentary colors, one may easily observe another shade, called the "tint of passage," of an impure citron shade. The angle at which this sensible tint becomes appreciated is noted by the index upon the graduated scale and from this number the temperature in degrees is calculated.

During the early part of the burning I apply my thermometer through holes in the crown of the kiln and keep a careful record of the readings. Later I use the pyrometer described above applying the instrument at the peep holes through the end of the kiln, at top, center and bottom. I have not yet obtained sufficient data from which to publish any generalizations, I merely indicate the direction of my efforts to obtain an improved system of burning brick.

Written for the Clay-Worker.

BURNING OIL FOR MANUFACTURING PURPOSES.

No. 3.

Dear Will:—In the foregoing letters I have stated the amount of oxygen necessary to convert carbon into carbonic acid, and hydrogen into water, and I want now to impress upon your mind that this conversion or change is not merely a mechanical change or mixture, but is the result of an operation called *chemical combination*, a much closer union than the most intimate mixing could produce; it is, therefore, highly necessary that you should have clear views concerning both, although it sometimes requires a little thought and penetration to distinguish the difference. If you take powdered charcoal and flowers of sulphur and mix them intimately together you produce by *mixing* a greenish brown powder, which still remains a powder with the colors blended. If you now take this same mixed powder and heat it in a closed vessel until you vaporize the sulphur, you will produce a very clear and volatile *liquid*, called bisulphide of carbon. This change has been effected by *chemical combination*, brought about by the agency of heat. Thus you see, by mixing you obtained a powder similar in appearance to what you might have expected, nothing more, but by combination your results are very different from what might have been expected, for, from two opaque solids you have produced a perfectly transparent liquid. Many such examples could be given; also of liquids producing solids, but let it now suffice to state that two of the leading characteristics of chemical combination are, the production of compound substances with totally different properties, functions and features, and generally, the development of heat.

It seldom occurs that simply mixing will produce heat; or that solids combine with each other, it is usually necessary for one, at least, to be in either the liquid or gaseous state. The burning of coal, coke or charcoal, are examples of a gas combining with a solid. The burning of alcohol, naphtha, and oil, are examples of a liquid combining with a gas; and the burning of natural, or artificial gas serve for examples of a gas combining with other gases. You will observe that in all these examples I say "a gas combining," etc. You have, no doubt, anticipated me by saying "oxygen is the gas alluded to." Yes it is, and the different forms of matter mentioned as combining with oxygen are all resolvable into fuels, hydrogen and carbon, the little extraneous matter generally left, being impurities, and as I stated in letter No. 1, these are the only available fuels we are acquainted with. I may here add also that oxygen is the only available *supporter* of combustion that we know of; and the chemical combination of these three *elements* produce practically all of the heat of our furnaces, kilns, stoves, grates, etc.

It is an ascertained fact that one pound

carbon in combining with two and two-thirds pounds of oxygen gives out a definite and *known quantity* of heat, viz: 14,500 heat units, and that one pound of hydrogen combining with eight pounds of oxygen gives out 64,000 heat units and is converted into nine pounds of water, the carbon and oxygen is converted into three and two-thirds pounds carbonic acid. These units of heat are often called "Thermal nuts;" this is a term you are perhaps not conversant with, but do not stagger at it, I will explain it by and by, for the present I must ask you to take it for granted that measures of heat are just as easy and practicable as measures of milk; you must not, however, confound them with the measures of temperature which are made with a thermometer, etc., this last is a measure of *quality*, but the thermal unit refers to *quantity* of heat. To illustrate this, and to pave your way to the idea of thermal units, let us suppose a pan containing a gallon of water, standing on the stove, and beside it a small pan containing only a pint; a thermometer dipped into each pan, shows the water in each to be of the same temperature, say 200°; now the large pan contains just eight times as much water as the small one, we may, therefore, reasonably conclude that the large one contains eight times as much heat as the small one, or that the stove had to give the large pan eight times as much heat as the small one to raise them to the same temperature, assuming, of course, that the water was of the same temperature in each pan before they were put on the stove, say at 40°. You will have no difficulty now, I think, in discerning the difference between the measures of the thermometer and those of the thermal unit. With this brief introduction to the thermal unit, or, *the effective measure of heat*, we will return to our fuel, hydrogen and carbon, and to their oxidizers, oxygen. When combination has taken place between these fuels and oxygen, the fuels are said to be oxidized, or burnt, and as oxidation always develops heat, it is only another name for burning. This is also our only available means of generating heat, and for this reason alone it is highly essential that we should understand it as clearly as possible. Carbon then, oxidized or burnt to carbonic acid invariably generates 14,500 units of heat, and hydrogen oxidized or burnt to water as invariably generates 64,000 units of heat, always, however, depending upon the *complete* combination with each other in the properties stated above.

From a theoretical standpoint, the time required for this combination to take place is of no consequence whatever; the amount of heat developed is the same. We may burn one pound of hydrogen in a gas burner at the rate of four cubic feet per hour, requiring forty-five hours for its consumption, or, we may mix the proper amounts of hydrogen and oxygen in a vessel and apply a lighted match, or for safety, an electric spark, and thus produce an explosion, generating precisely the same amount of

heat in the fraction of a second as by the gas-burner requiring forty-five hours to accomplish it. From a practical standpoint, however, it is of the utmost importance that we should be able to control the rate of combination, and accelerate or diminish its rate to meet our industrial and domestic requirements; hence, we have chimneys, fans, bellows, etc., to increase our draft, or in other words, to hasten our combustion, while we have our damper, etc., to retard it when necessary. Combustion may take place so slowly that the heat developed may be quite imperceptible, or it may be hastened up to the explosive point. Our business at present is to deal with the mean of these results, chiefly on the side of rapid combustion, but well on the safe side of explosive combination.

Let us now enquire a little into the causes of high temperature, and the conditions requisite for its production. If we take our pans of water at 40°, mentioned above, and by giving the small one a certain amount of heat, we raise the temperature of the water to 200° but by giving the large one the same amount we only raise its temperature to 50°, or an increase of 20°. High temperature then appears to be a certain quantity of heat in a concentrated form or state or the generation of a large number of the heat units in a small place and in a short time as in metallurgical and other furnaces, blacksmith's fires, etc., this *intensity* of heat or high temperature, will be reviewed later on.

We have now arrived at a point where it is necessary to say something about the source of oxygen. There are many substances in nature that may be made to furnish oxygen, but not in sufficient quantities, nor cheap enough for practical purposes; the atmosphere, however, is a vast storehouse from which we may draw as heavily as we wish, but in taking our supply from the atmosphere we must take along with the oxygen, and mixed with it another gas, which plays no part in combustion except to retard it, and for every gallon of oxygen we take, we must also take along with it four gallons of the other gas, nitrogen. This, at first sight, seems an unfortunate arrangement, and complicates our beautiful combining theory dreadfully, and we long to discover some potent agent that would arrest this inert and apparently useless gas before reaching the fire and lead it off in another channel so that we might have a stream of comparatively pure oxygen enter the fire and do its combining in that "free and easy," and *lively* fashion, so characteristic of pure oxygen when put in contact with carbon or hydrogen. This used to be my ideal method of accomplishing complete and rapid combustion; it is not so now, moreover, in a future letter I may have something to say in favor of "inert" and "useless" nitrogen, even in connection with combustion.

According to Prof. Thomas, the atmosphere—setting aside trifling quantities of moisture and other gasses—is a mixture of 20.0265 part oxygen and 79.9735 parts

nitrogen by measure, or in round numbers very easily remembered, 20 of oxygen and 80 of nitrogen. Now as nitrogen plays no chemical part in our fires, we must calculate how much air will be required to supply the necessary oxygen. From the specific gravity of oxygen it is found that 11.20 cubic feet will weigh one pound, and as stated above, one pound carbon requires two and two-thirds pounds of oxygen to burn it to carbonic acid. Now it is impracticable to *weigh* our air supply, but it is comparatively easy to *measure* it, and from its measure calculate its weight; thus one pound of air equals 11.20 cubic feet, therefore, two and two-thirds pounds or two and sixty-hundredths pounds equal 29.86 cubic feet, and as we are obliged to admit four times this quantity of nitrogen, or four times 29.86 equals 119.44 cubic feet of nitrogen, this added to the 29.86 cubic feet of oxygen makes 149.30 cubic feet of atmospheric air, this then is the *theoretical* quantity of air required to burn one pound of carbon, but our means of supplying this are so inefficient and wasteful that in practice we require from one-half to double this quantity. For convenience of calculation and easy remembrance we will cut off the decimals, and call the theoretical quantity of air 150 cubic feet, and the practical quantities 225 to 300 cubic feet of air to burn one pound of carbon. If we were burning hydrogen gas instead of the solid fuel carbon, we should need just three and one-half times the theoretical quantity needed for one pound of carbon, or instead of 150 cubic feet we should want 525 cubic feet of air for one pound of hydrogen. We may presume that hydrogen could be properly consumed with a little over the theoretical quantity of air, but as it is never used alone on a large scale, we may cease conjecturing on it for the present.

I have endeavored to show you in this letter that burning fuel properly, involves something further than deftly handling the shovel, slice-bar and rake; it is a grand chemical phenomenon and the better it is understood the more it is apt to excite wonder and admiration, apart from its comfort and power producing properties. To study the chemical combinations and reactions taking place in a burning fire, enlarges enormously the scope of a lively imagination and invests it with many other interests in addition to the fanciful study of faces in the fire.

You will do well to put down in your note book, some of the facts and figures mentioned above; my experience is that *once writing* any statement or table impresses it better on the memory than *half a dozen times reading*. Write it neatly with *pen and ink*, and start it with a conspicuous head line, you will find it worth all your trouble, do not excuse yourself on the plea that you have it in print; my note book contains very many things that I have also in print. When you have copied these facts and figures and the table at the end of this letter, let your mind revert to your oil gasifier and burner

and reflect again on the conditions surrounding it. You will see presently more clearly the nature of the hydro-carbons; that they require more air for their combustion than coal, coke or other carbonaceous fuels. We will suppose, for example, your oil contained fifteen per cent. of hydrogen combined with the carbon, both in the liquid state, of course; the 300 pound barrel then contained 45 pounds hydrogen and 255 pounds carbon, then from data in your note book you can calculate that the hydrogen would require 360 pounds of oxygen and, that this means 20.115 cubic feet of air. The carbon would require 680 pounds of oxygen and the atmospheric air to supply this would be 38.080 cubic feet or a total of 58.195 cubic feet for the barrel of oil; whereas the same weight of simply carbonaceous fuel would require but 800 pounds of oxygen, or 44,700 cubic feet of air; a difference of 13,495 cubic feet, or 30 per cent. less. Thus you see that hydrogenous fuels demand a much greater supply of air than carbonaceous fuels, and means must be taken that this demand is complied with, you can not get around it any other way. Not all the practical common sense cajolery in the world will induce hydrogen to give up its 64,000 thermal units, nor can it be accomplished by brute force. The only thing that will satisfy a chemical demand is strict compliance.

Having now determined the quantity of air essential for producing the best results let us turn our attention to the means of supplying it. Many practical men contend that the air should all pass *through* the grate and fuel; "so that it may be completely burnt up;" they, therefore, advocate a thick bed of fuel, and close fitting furnace doors; reasoning with a good show of common sense, "that the more fire it is made to pass through, the more thoroughly it will be burnt," and accordingly pile fire on the grate until it is evident they are choking the draft, then they decide to "let her burn down a little" after which they fire lightly and often; while others vary this a little by firing heavier and not so often. This is the daily practice of men who have had charge of furnaces and fires half a life time, and they can all give you plausible reasons for their methods. Reasoning, in nine cases out of ten, with these men would be useless, and you will save time and patience by letting them see another man with diametrical ly opposed methods producing much better effects with two thirds of the fuel.

Let us now look into the effects of burning anthracite coal with the close fitting furnace doors and a thick fuel bed, of course the size of the coal will materially affect the result. The oxygen of the air in passing through a fire, combines with the carbon to form carbonic acid, if it could then, in that state pass into the flue or chimney, it would be a case of complete combustion, and 14,500 thermal units would have been evolved, but, if instead of this carbonic acid being liberated and passing away up the chimney, suppose it has to pass

through a thin stratum of bright, hot carbon; by this slight and momentary contact with the hot carbon, the carbonic acid takes up another equivalent of carbon and is changed to carbonic oxide, there is thus formed, two measures of carbonic oxide, and these two measures finding no oxygen on the top of the fire to convert them into carbonic acid, pass up the chimney as so much unconsumed fuel, consequently so much *wasted* fuel and without the slightest manifestation at the top of the chimney.

Such waste shows the fallacy of admitting no air above the fuel, and especially so with a thick firebed; in fact, the results ought to lead us to a different conclusion, viz.: the thicker the firebed, the more need of air supplied on top. With bituminous coal the results would have been worse still, but I cannot in this letter take up the case.

In conclusion, let me urge you to think over and try to grasp the significance of the terms, chemical combination, combustion, thermal units, etc., and familiarize yourself with hydrogen, oxygen, nitrogen, carbon, carbonic oxide and carbonic acid, remembering also that only one of these substances is solid, viz.: carbon, the others are transparent, inodorous gases, and cannot, by sight, be distinguished from the air we breathe; they are recognized only by their qualities. You will also deepen your interest in these letters by putting into practice such chemical truths and theories as you may from time to time acquire.

The following table—which you may extend at your leisure—is based and calculated from the specific gravities of the gases at a temperature of 60° Fahr., and and barometric pressure of 30 inches, and is in my estimation a useful table for reference:

No. 1.	1 lb. atmospheric air	measures	12.38 cu. ft.
" 2.	1 lb. nitrogen gas	"	12.74 " "
" 3.	1 lb. oxygen gas	"	11.20 " "
" 4.	1 lb. hydrogen gas	"	180.00 " "
" 5.	1 lb. carbonic oxide	"	12.81 " "
" 6.	1 lb. carbonic acid	"	8.10 " "
" 7.	1 lb. marsh gas	"	22.33 " "
" 8.	1 lb. ethelene	"	12.65 " "
" 9.	1 lb. ammonia gas	"	20.80 " "
" 10.	1 lb. steam	"	20.00 " "

No. 1 is a mechanical mixture of gases. Nos. 2, 3 and 4 are simple or elementary gases; 5, 6, 7, 8, 9 and 10 are compound gases. Nos. 7 and 8 are known also as light, and heavy hydro-carbons, or carbureted hydrogens. A statement of the weights of air required for carbon, crude oil and hydrogen, respectively, may perhaps amuse or astonish you:

1 ton carbon requires at least 18 tons air.
1 bbl (300 lbs.) crude oil requires at least 2½ tons air.

1 ton hydrogen gas requires at least 43 tons air.

Yours paternally,
HYDRO-CARBON.

A GREAT MANY DO.

R. C. George, of Williamsville, Ontario, on sending his subscription, says: "I am much pleased with the CLAY-WORKER. I am a brick manufacturer and find a great deal of information in it. It is a paper all brick manufacturers should patronize."

CORRESPONDENCE.

THESE COLUMNS ARE OPEN TO ALL. THE FULL NAME AND ADDRESS IS REQUIRED BUT WILL NOT BE PUBLISHED EXCEPT WHEN PERMISSION IS GIVEN BY CORRESPONDENT. THOSE DESIRING TO COMMUNICATE PRIVATELY WITH ANY CORRESPONDENT WHOSE FULL NAME IS NOT GIVEN CAN DO SO BY ADDRESSING LETTERS CARE OF CLAY-WORKER.

High Praise.

Editor Clay-Worker:

"R. Brick," in the November number of the CLAY WORKER asks, "Do the brick-makers of the United States appreciate what has been done by the National Brick Manufacturer's Association?" Without wishing to detract one whit from the work done by the National Association, it does seem to me that the fact that such an association exists belongs to the clayworker. Its founders recognized that a large body of men all over the country who believed in the possibilities of their profession could do more and accomplish sooner the results sought for, if in some way they could be brought to work together.

It took years of hard work to convince the craftsmen that any good could be gained by their coming together. The early editions of the CLAY-WORKER were hardly to be compared to the magnificent issues of the present, but the ideas, the germs of its present were seen in its first issue. The CLAY-WORKER has done more for the brickmakers of the United States collectively than all other agencies combined. It has made our calling more honorable, it has awakened in our minds desires and ambitions to improve ourselves and fellows, it has furnished us a cyclopedia of information of priceless value to all who believe in progress. It brought together at Cincinnati a few men who felt that "the art" was behind the times and by its almost unaided efforts the National Association was formed. I agree fully with "R Brick" in his review of the work of the Association, but without the CLAY-WORKER we should have had no Association. I am writing this on Christmas day, with my heart filled with thankfulness for all the blessings vouchsafed me during the year. "Peace on earth, good will to men"—and for nothing am I more grateful than "The CLAY-WORKER."

An editor of one of the largest daily newspapers in the United States said to me once "I think the CLAY-WORKER the best trade journal in the country." While this was high praise, I think it deserved and am glad to see that its proprietors begin to appreciate its merit themselves. Almost every brickmaker pays from \$3 to \$5 per year for other monthlies, no one of which begins to compare in value to them with this—devoted exclusively to their interests. I inclose \$4 for two copies of the CLAY-WORKER for 1891, one to be sent to myself and one to my foreman.

If you should double up again I should still be with you.

A CONSTANT READER.

Chicago, Dec. 25, 1890.

Machine vs. Hand-Made Brick.

Editor Clay-Worker:

Your correspondent, "Kali," has written several very good letters on above subject to the CLAY-WORKER. He, however, appears to me to aim too much at proving the inferiority of machine bricks, rather than, by impartial discussion to help to determine which is the best and most profitable method for the benefit of all concerned. I cannot but think that his description of the "mad rush from clay bank to clamp," in speaking of Chicago machine brickmaking, also what the result would be if imperfect bricks were returned to the hopper, is very much overdrawn. Regarding the latter I can hardly imagine such a thing possible. It would clearly prove an utter incapacity on the part of the owner of the yard, which could only end, in any business, in "shattered hopes, and a flattened pocketbook."

"Kali" asks if ever Mr. Greer heard of a hand brickmaker, who gave his business proper attention, failing, etc." I never heard of anyone who gave his business proper attention, failing; except from some outside casualty, from which hand brickmaking is no more exempt than any other calling.

"Kali" somewhat misquotes me when he says, "He remarks again, indeed, if the hand yard has any use at all." What I said, was, "if, indeed, hand making has any advantages to point out;" and after carefully reading all that has been written on the subject in the CLAY-WORKER, I would still like to have its advantages pointed out to me, if they exist.

In my opinion hand brickmaking will ever afford a very good living for the practical worker who himself molds the bricks, while his sons or hired help do the off-bearing, etc. The strongest company with the most improved machinery, cannot "drive out" such a man; but for the capitalist, or one who wishes to leave to his sons something from which they can without constant toil, live by their heads instead of their hands, it, at present, offers very few inducements.

In talking of the use of the hand yard, "Kali" rather "gives himself away," when he says it is a thing from the profits of which, in three or four years, a machine plant can be erected, etc. His advice to first try making a few bricks on an inexpensive plant, is good; but why make them by hand, when plenty of good horse-power machines can be had at a very trifling extra expense, and will be a better preparation for the thirty, forty or fifty thousand machine plant later on.

I have to employ a few hand-molders here to make roofing tiles, etc., and I calculate it costs as much to put the tempered mud beside their tables, as it does to place the same in bricks, on pallets in the drying sheds, ready for the kiln.

One thing all hand-making advocates seem to take for granted, is the superiority of their brick. This is a point on which I am not posted, but I notice in all trials where an extra strong brick is

required (as for paving, etc.), it is almost invariably a "Penfield," "Chambers," or some other good machine-made brick which is selected.

I would again close with some advice to "the old hand-made fellows." Don't abandon profitable hand yards, but add to your plant a good horse-power soft mud machine. I recommend this kind because it is the only one with which I have had any experience, though my thoughts are at present going in the direction of stiff mud. Adopt my plan of never allowing a defective brick to leave the dumping table, (it has a wonderfully good effect on the men) and I'll guarantee, that, if you get "Arnold's molds" and use ordinary care, you will not have one quarter of one per cent. to return to the pug mill, nor any rough bricks to "sort 'o feel sick" about. Give the machine a fair chance, and if at the end of the season you can conscientiously say that it does not beat hand molding, I'll gracefully retire from the advocacy of "Machine vs. Hand-made Brick."

ROBERT M. GREER.

Tuxpan, Mexico.

P. S.—In July issue of the CLAY-WORKER, "Village Brickmaker" states the shrinkage on his yard "from the brick table to the pocketbook," on three years' work, as two and two-tenths per cent. This is remarkably small, but I would point out that it is before the brick leaves the table that the machine advocates claim to have the advantage.

What the National Association Has Accomplished.

Editor Clay-Worker:

For a number of years, as you know, I have been devoting my entire time to the study of clays and the clay manufacturing industry, and have seen and conversed with a great many prominent clay men in various parts of the country, and have, therefore, had an opportunity to notice the wonderful development that has been taking place in the clay industry during the last half decade.

"Well, what of that?"

It is this: That a very large per cent. of the leading manufacturers of clay wares have observed this same development, and have almost universally given a large share of the credit to our National Brick Manufacturers' Association, and kindred State Associations.

I have heard it commented upon time and again, that these associations have brought the interest of the craft closer together. That clay men have been induced to read and write clay literature. Through these mediums the craft in one state has, to some extent, been benefited by the experience of those in another State.

Valuable comparisons have been made through the columns of your journal by men, who, personally, never knew each other, but whose ideas, successes and failures are as familiar one to the other as if they were next door neighbors.

The stimulus given out by the National Brick Manufacturers' Association at its

Convention, carries the tide of progress from one year to the next. We are not through discussing the many new and valuable points brought to light at one Convention until we find ourselves assembled at another.

Though our membership does not include all the craft, our preaching is heard by all, and though we occasionally hear of an objector, in the main we have every reason to know that our missionary work is having its effect. Many names are being added to the Roll of Honor; only last year we took in an entire city, and it is surprising how many of our members have "Philadelphia" affixed to their names.

I am told by men who ought to know, that no one season ever witnessed so marked an improvement in the methods of brickmaking in Philadelphia, as the last.

Of course, we do not expect to mark such wonderful improvement in Indianapolis, as most of her brick men have been members of our Association from the beginning, but we do expect to have such a Convention there that its influence for good will be felt for years.

Notwithstanding we began on a very high plane at our first meeting, we expect, at Indianapolis, to reach still greater heights.

Let every one come with a full grist of ripe thoughts.

I believe we are to have the very best Convention we have yet had.

Many of our elder members have learned to get at the kernel of things with less verbiage, and, no doubt, we all have learned to have more charity for the mistaken ideas of others, and more appreciation for the good and new points that may be brought out.

I imagine those who are charter members of the Association begins to feel a little just pride of its wonderful success.

Waiting anxiously to see all of our old friends and many new ones, I am

W. A. EUDALY.

An Important Movement.

Editor Clay-Worker:

As you remember, at our last Convention held in Philadelphia, a Committee was appointed on the "Nomenclature of Brick," and in view of this fact, and being Chairman of the Committee, I have sent out a large number of letters, reaching, as far as possible, every part of the United States, in which I submitted a number of questions. To these I have received a number of replies, and, no doubt, will receive others.

My purpose in this is to call the attention of the craft to the deep interest manifested in our coming Convention.

In almost every reply some favorable allusion to our meeting, to be held this month at Indianapolis, is made.

The replies to the "Nomenclature of Brick" have been full, and a general desire has been expressed that we adopt names for the most prominent kinds of Brick, which shall be uniformly applied and understood.

As it is impossible to hear from all

that we would desire to hear from before the Convention meets, we desire that all who can, prepare and hand to the Committee at the Convention, the names of the various kinds of brick made in their several localities, together with a short description of each and oblige the Committee, in the interest of the National Brick Manufacturers' Association.

W. A. EUDALY.

Cincinnati, O., Dec. 29, '90.

A Peculiar Clay Formation.

Editor Clay-Worker:

I enclose you postal note for \$4.50, for which please send me "Brickmaking and Burning," by J. W. Cray, Sr., and apply balance on subscription account for CLAY-WORKER.

We have formed a company, \$25,000 stock, and have purchased a Lion Dry Press. We make a fine quality of cream colored brick, also a dark red brick similar to the St. Louis brick. We have 25 acres of clay 18 feet deep. The red and cream colored clay are side by side, divided almost by a distinct line.

Please send CLAY-WORKER to Smithville, Bastrop Co., as usual. No brick-maker can afford to be without it.

Yours truly,

JAS. B. SMITH.

Smithville, Tex., Jan. 5; 1891.

Wants a Crusher and Pulverizer.

Editor Clay-Worker:

I am a constant reader of your paper, and would like to know from you or through your columns of the best apparatus you can recommend for grinding hard shale rock into fine powder—and state weight, power required, capacity and price.

B. CLARK.

257 Cumberland St., Brooklyn, N. Y.

A Much Needed Work.

Editor Clay-Worker:

Your esteemed favor of the 19th is received. I have, also, received "Brickmaking and Burning," which I think a practical and valuable work, though a little short in explanatory detail, quickly noticed by a novice though easily overlooked by an expert. In the hope that it may be more explicit and give us a little more of the "Mortar between the Bricks" of solid fact, I herewith enclose \$5.00—\$3.00 for the "Brickmakers' Manual," as per notice in December CLAY-WORKER, and \$2.00 for another year's CLAY-WORKER.

There is a loud call for a reliable, concise and practical work, giving plans, specifications, quantities of material with detail estimates of cost, based on a certain price per day, and number of days, of the different grades of labor employed in the work and the actual cost of the material, delivered on the ground, for brick buildings of moderate cost, such as dwellings, store buildings, school-houses, churches, etc.

Here is a chance for some good, practical, intelligent mechanic, of extended experience to distinguish himself and

make some money. I have Palliser, Palliser & Co.'s "New Cottage Homes," but (without affecting the critic) it seems to me to affect too much of the elaborate "Queen Anne" and not enough of the modest, neat, comfortable, solid and cheap style of architecture called for by the average sensible American home seeker in village and country, who is seeking not so much the ornate and extravagant style of other centuries as the neat comfortable home that comes within the reach of his pocket book.

Judging from Mr. Cray's terse and practical style of writing and experience, I think he ought to be able to fill the bill. I hope you will put this flea in his ear.

Let me say in conclusion that though my subscription list embraces many papers and periodicals, the advent of the CLAY-WORKER is hailed with more satisfaction than any of the others and claims my first attention.

Wishing you a Merry Christmas and a prosperous and Happy New Year, I am

Very Respectfully Yours,

Longmont, S. D. CYRUS COLE.

It Pleases Our English Cousins.

Editor Clay-Worker:

Please find enclosed renewal of subscription for your interesting paper, THE CLAY-WORKER. And as one who for over twenty years has had the establishment and control of a works whose varied yearly capacity is over fifteen millions allow me to congratulate you on your matter and style. JAS. WHITEHOUSE.

Nottingham, Eng.

Brickmaking in Montana.

Editor Clay-Worker:

Some of your many readers may perchance be interested in a brief letter from the young, but progressive State of Montana. I came here in October to assist the Standard Fire Brick Company, of Anaconda, to build and burn their kilns. The company was recently organized and its officers are among Anaconda's most enterprising citizens. J. B. Losee is president, Col. S. A. Estes, treasurer and C. C. Thurston manager. The plant will, when completed, cost \$50,000 and is modern in every respect. The machinery and fittings for dryer were furnished by J. W. Pennfield & Son, of Willoughby, Ohio, which consists of 125 horse power Atlas engine and boilers complete, one dry pan, two wet pans, Blake ore crusher, pug mill and soft mud Penfield brick machine with steam dryer. The material to be used is called Dillon rock, which is shipped in on the Union Pacific railroad, and also a small portion of Thompson Falls clay. They mix seven-eighths of Dillon rock, which is .98 per cent. silica, with one-eighth of Thompson Falls clay, which is an alluvial deposit. The rock is white and very hard. It is first put through a Blake ore crusher, then passes through a dry pan, is elevated and passes through a revolving screen into a large hive, from there it goes into the wet pans to

be thoroughly mixed with the other clay, then goes into the pug mill and machine. The company have been manufacturing brick near their smelting works in a crude way for some time, and intend to abandon that as soon as the main plant is in operation. We have two Eudaly kilns up and will build three more to serve the capacity of the machine, which is about 25,000 per day. As the plant was not ready to start when we had the first kiln complete, we made enough brick at the old works and shipped them on the cars to fill the kiln and burn. Those brick were made of five parts Dillon rock and one part Colorado clay, which is 65 per cent. silica. The company was very much pleased with the result of the trial kiln, especially in the item of fuel. They had been using from a ton and a half to two tons of coal to burn a thousand brick. We had 73,000 brick and burned 63 tons coal, which was quite a saving. Coal costs from \$7 to \$9 per ton and wood \$3.75 per cord.

We carried a heat sufficient to melt St. Louis and Colorado brick, for we used both in the construction of the kiln. These silica brick are about one-eighth of an inch larger after being burned than before, and the company claim, so far as have been tested in their smelting works, to be equal in every respect to the English silica brick. The main building of this plant is a heavy frame sided up with rough plank then covered with building paper and that covered with corrugated iron which is intended to keep it comfortable for the workmen during the severest cold weather. The whole building is floored with two inch-pine lumber. Taking it altogether it is by far the finest brick plant in the State of Montana. Anyone interested in the manufacture of silica brick and wanting to see a complete plant in every respect it will pay them to visit Anaconda and look around. Col. Estes, the treasurer, or Mr. Losee, the president, will take great pleasure in showing them through the works at any time. They will find that they don't do things by halves in Montana. Everything is built from first class material and must be all first class in workmanship regardless of expense. Common laborers get \$2.50 to \$3.50 per day, brick layers get \$6 to \$8, carpenters \$4 to \$5, brick setters, \$4, burners \$5 and everything else high in proportion. I will leave here in a few days to eat Christmas turkey at home. Wishing the CLAY-WORKER staff a merry Christmas and a happy New Year I am

Very truly yours,

W. M. BURTON.

Use of Escaping Heat.

Editor Clay-Worker:

Replying to "Subscriber," on page 426, December issue, beg leave to inform Mr. "Subscriber" that we are now using two down-draft kilns of Newman S. Clark's patent, which we now own and control, and which is so arranged that the escaping heat from one kiln, dries or water-smokes the other, and we are now building two more kilns, all connected with

one smokestack, and are arranging to use the escaping or exhaust heat from one to the other all round. Would be pleased to correspond with "Subscriber" and give him all information in our possession.

OMAHA (NEB.) PAVING BRICK & TILE CO.

All Are Invited.

Editor Clay-Worker:

At a meeting of the Ohio Brick, Tile and Drainage Association in 1889 it was determined to have a large meeting of the fraternity at their next annual meeting, to be held at Columbus, Ohio, Feb. 25th and 26th, 1891, and a committee was appointed consisting of B. W. Blair, R. E. Farnham and J. W. Everal to call attention of the craft in the State and have a large attendance. The committee would be under obligations to the CLAY-WORKER if, in its next issue, it would call attention to the matter, as we know, with its large circulation, it will reach many of the clayworkers. It might be well to add that an interesting and entertaining order of exercises have been arranged and it will be profitable for all members and manufacturers to attend. Distinguished and able brick manufacturers from other States have been invited and will read papers, and it is the wish of the committee to have a large attendance.

Committee. { B. W. BLAIR,
J. W. EVERAL,
R. E. FARNHAM.

New York News.

Editor Clay-Worker:

There has been two big failures here during the month that has just drawn to a close and the brick market is consequently in the most depressed condition. The first failure was that of Peck, Martin & Co., one of the oldest and most prominent firms in the building material line in the city. On the 12th inst. it made an assignment to George S. Hamlin, a lawyer. The members of the firm are Joshua S. Peck, Nathan Peck, and Robert C. Martin. A preference of \$13,000 out of the individual assets of Joshua S. Peck is given to the executors of the estate of W. J. Peck. The firm claimed a capital of over \$200,000, upon which they did a very large business, giving notes, it is said, liberally, both for purchases and discounts.

Besides their business in New York the firm had an interest of about \$40,000 in brickyards at Montrose Point on the Hudson, while Mr. Martin individually is a large stockholder in the Rose Brick Co., near Newbury, N. Y., his investment there being estimated at over \$100,000. The firm had fought the Central Labor Union for three years, surrendering in June of last year. The firm also suffered some loss by last Fall's boycott of Verplanck brick. It was stated on behalf of the firm that the liabilities were about \$300,000 and the assets over \$400,000, besides individual assets of \$100,000. A large part of the

firm's liabilities are secured by collateral in the hands of creditors, while the firm's assets consist of stock on hand and accounts due by builders. Inability to secure these accounts to meet maturing obligations was the cause of the assignment. The firm employed about 70 men, all of whom were temporarily thrown out of work.

The schedules of the firm showed liabilities of \$537,398.27, as against nominal assets of \$534,439.85, and actual assets, \$329,559.91. The nominal assets consist principally of accounts for brick, etc., many of which are probably worthless, while the accounts and bills receivable amounted to \$388,210.16, of which \$200,000, it is thought, can never be collected. An effort is now being made by W. K. Hammond, Warren Ackerman, Hiram Snyder and Charles F. Dickinson, a committee of the creditors, to secure signatures to a proposed settlement, on the basis of the payment of the claims in full, on the basis of one-third in sixty days, one-third in six months, one-sixth in two years. It is thought that this settlement will be accepted.

Following close on the heels of the Peck, Martin & Co. failure came that of the Lorillard Brick Works Company, of No. 65 South St., and Keyport, N. J., which was placed in the hands of a receiver, Charles Siedler, who was appointed by the Court of Chancery at Trenton, on the application of Henry Turner, a New Jersey creditor, and afterward appointed auxiliary receiver by Judge Pratt, of the New York Supreme Court, on the application of Jacob Lorillard, Jr. It is said that the company has been carrying a large amount of real estate and builders' paper, the latter estimated at over \$200,000, and were short of ready cash.

The brick works at Keyport were said to be the most complete in the United States. Jacob Lorillard started them in 1886, and spent a large amount of money in improving and extending them. In October, 1888, the present company was incorporated under New Jersey laws, with a capital stock of \$600,000 and bonds amounting to \$335,000.00, all issued to Jacob Lorillard for the Keyport property, which he turned over to the company at a valuation of \$935,000, the property representing a total cost of \$750,000. The property included 270 acres of clay bearing lands. Jacob Lorillard was the president of the company, while R. C. Guyer was the secretary and treasurer.

The company sold its bricks directly to the consumers and to its dealing largely with the speculative class of builders and carrying acceptances for large amounts, the collapse is said to be largely due. Jacob Lorillard himself blamed a morning paper of this city largely for the misfortunes of the company, claiming that it had published reports stating that the clay had given out at Keyport. A suit for \$100,000 damages will be brought against the paper.

Seven judgments, aggregating \$268,096,

have been filed against Jacob Lorillard, the president of the Lorillard Brick Works Co. Receiver Charles Siedler is continuing the business. Mr. Lorillard claims that the liabilities of the company are about \$750,000, while the receiver thinks they may reach \$2,000,000, including the capital stock, bonds, and mortgages. The assets are nominally between \$1,500,000 and \$2,000,000.

In the face of these failures, it is not at all strange that an unsatisfactory condition of the brick market is to be reported. A great many bricks were sold during the month, but not nearly as many as for the same time last year. Prices, too, are decidedly low, being quoted at \$5.50 and \$6 for Haverstraws. The accumulation in the market at the present time is about three millions. The outlook for the coming year is not at all bright, a prominent dealer giving it to me as his opinion that the output will be most materially reduced next year, probably 100 machines being thrown out or permitted to remain idle.

Included in the new buildings to go up shortly is a handsome church and rectory, 50x100 feet to be erected in Baxter Street, at a cost of \$60,000, and 8-story brick, iron and terra cotta warehouse in East 12th St., to cost \$140,000.

BRIC-A-BRAC.

Interesting Brick Plant in New Jersey.

Editor Clay-Worker:

The Sayre & Fisher Co., situated at Sayreville, N. J., on the Raritan River, manufacture upwards of one-half million brick per day and employ over seven hundred hands. The entire city of Sayreville practically belongs to this company and is inhabited almost exclusively by their employees. Sayreville is situated on the Raritan River, about seven miles south of South Amboy. It is a most picturesque village of about 3,000 inhabitants. The company have about 5,000 feet of dock surface on the river.

They have the distinction of being the largest works of their kind in the East, if not in the world. They are a most important factor as feeders to the great New York market. However, their field is the world as their own vessels carry their product into nearly every port in the Atlantic Ocean and Gulf of Mexico.

We doubt whether any firm in the United States can show such far reaching interests as this. Their clay beds situated in the heart of the rich deposit lands of New Jersey, contain a greater variety of clays than can be found in this or any other country. An enumeration of their resources in this line would be bewildering to the reader.

For making common brick they use a machine of their own manufacture which is as novel as it is useful; description of it at some later day would be interesting to your readers. About thirty machines of this class are used. Their better grades of brick such as buffs, Roman, red or white fronts, etc., are made upon a Penfield Machine and repressed

upon the Raymond Power Presses, several of which are in daily operation. Drying kilns built by Geo. W. Sharer, of Philadelphia, Pa., furnish them with a speedy mode of drying so great a number of bricks. Altogether they use the most improved machinery and methods of handling brick known.

Notwithstanding the immense business done by the firm and the number of employes, it moves without jar or friction controlled by Mr. E. A. Fisher, to whose great ability as an organizer and director, is due much of the success of the firm.

The writer who visited the factory recently is under many obligations for a generous and hospitable reception, and hopes it may be the province of the CLAY-WORKER to write in detail a description of this remarkable plant, as such cannot fail to be of interest to the readers.

C. W.

Agree Yet Disagree.

Editor Clay-Worker:

Please bear with us in a brief answer to "R. Brick" in Dec. No., with whom we agree every particular if we view things from his standpoint. But if a kiln has been or can be made, which will conduct the heat twenty or thirty feet before permitting it to come into direct contact with the product to be burned, and in its passage storing a portion of its heat where it will soon do very effective work, this storing, for a time, so modifying its intensity as to render it harmless when thoroughly distributed throughout the entire body of the ware to be burned, our views differ very much; because, under such conditions, much more heat may be generated in a given time without any injury to the ware. The same advantage is present in the cooling process, since the cool air must pass the same distance through this, now intensely heated, medium, and in its passage takes on sufficient heat to again be harmless when distributed to the ware. If such a kiln does, or ever may exist, the time required to burn any quantity of any ware, be it great or small, can be materially reduced, and much better results obtained.

Who has burned on an up-draft kiln—either tile or brick—and has not, at some time in his experience, known, by the degree of heat or by the necessary settle, that a certain part—or parts may-be—of his kiln was sufficiently burned in a given time, after applying full fires? And then been compelled to "go slow" in order to save the burned part while

bringing up the others, as many or more hours longer? Has not the unloading of such kilns proved that the rapidly burned ware was often, in every respect, equal or superior to the more slowly burned parts? This has been our oft repeated experience. We therefore assert, had the same degree of heat been as rapidly and violently applied to all parts, all parts would have been burned in the shortest time required for any part. Then, the usual method of firing under such circumstances, viz., cooling to or below a cherry red, then heating to an excessive degree, again cooling, heating, etc., is more damaging to the kiln and much more destructive to the ware, than to maintain a constant heat until done, and thus make one heating and one cooling answer for one kiln of ware.

STEWART BROTHERS.

STATE CONVENTIONS.

The Illinois Brick and Tile Association will meet in Springfield, Ill., Tuesday and Wednesday, January 13th and 14th, 1891.



The Iowa Brick, Tile and Drainage Association will meet in Des Moines, Ia., Wednesday, February 4th, 1891 at 10 A. M.

The Ohio Brick, Tile and Drainage Association will meet in Columbus, Ohio, February 25th and 26th, 1891.

NEW INVENTIONS.

The following is a list of patents pertaining to brick, tile, terra-cotta, sewer pipe, pottery, etc., and the machinery used in their manufacture, issued since our last number.

- 442,867. Preservative Compound for Brick, Stone, etc.—Lewis B. Drake, Columbus, Ohio.
- 443,413. Brick Machine—Herman H. Stukenberg, Kansas City, Mo.
- 444,009. Flower-pot Machine—Chas. McDonagh, Toledo, Ohio.
- 444,227. Brick or Tile Table—Geo. S. Tiffany, Tecumseh, Mich.

THE COMING POW-WOW.

The council fires will be lighted Tuesday evening, Jan'y 20th, at Indianapolis, and all mighty chiefs and medicine men, together with a great many braves from nearly all the tribes of clayworkers throughout the country will again gather together. The pipe of peace will be passed around and a new treaty of friendship and good will, will be ratified. Many questions of importance to all the nations will be considered. Water-smoke Slow, Brick-in-his-hat, Up-draft clamp, Stretcher-faced Charlie, Hand-made Frank, Wire-cut the Hard-burned, and all the most noted and eloquent warriors, except Stick-in-the-mud, have signified their intention to be present and participate in the great pow-wow. Stick-in-the-mud alone refuses to listen to the Great Father who calls his children together that they may devise better methods and unitedly strive for greater prosperity among all the tribes. Stick-in-the-mud is growing old and is contented to stay at home with his squaws. He says the cost of getting to the pow-

wow would buy beef enough for a week and that the young braves should talk more of war, put on their war paint and go after the scalps of those who are departing from the ways of their fathers. His followers are growing discontented, however, and, though they long to put on their paint, are listening with more interest than formerly to the great chiefs who talk of peace. They have heard that those who go to the pow-wow and smoke the peace pipe are favored by the Great Father, that food and fire-water is free to all, and, greater than this even, new and better weapons are given to every brave who will learn to use them. Some of Stick-in-the-mud's followers even are looking forward to a day of better things, and will, perhaps, join in the coming peace council where all the great chiefs and braves from every tribe and nation will assemble. Great is the pow-wow.

An old subscriber at Cleveland, Ohio writes under date of Dec. 23rd, having previously sent \$1.00 for CLAY-WORKER for '91: "I enclose the other dollar. The CLAY-WORKER is worth more than two dollars several times over."

THE CLAY-WORKER.

PUBLISHED MONTHLY.

INDIANAPOLIS, JAN'Y. 15th., 1891.

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tical men will always be welcome. Address all
communications to

T. A. RANDALL & CO.,

81 Massachusetts Ave., Indianapolis.

THE SOCIAL SIDE.

The benefits which accrue from the social relations of a convention are great indeed. Our National government and all governments in their diplomatic service appreciate the advantages of social intercourse. They recognize the benefits to be derived from judicious wining and dining, as promoters of good feeling. There is a reason in it all. The benefits which come from a social commingling of a large number of people who are interested along the same line, are capable of being analyzed, and the reasons therefore made clear. The more we know of the average man the more kindly we are disposed towards him. The exceptions to this statement are rare indeed. People who are positively of bad character are made better in all their relations through associations with better people. Fear of publicity hides many bad traits. A large acquaintance among our fellows elevates ones moral ambition. A man who makes the acquaintance of a large number of people at a brickmakers' convention is naturally anxious for the good will of all whom he meets, and as all come together at such times with their best foot forward, they have set a mark for future conduct. They all come to the convention, meet pleasantly, exchange kind words and set an example of general good feeling. After such an experience one is certain to make an unconscious effort to sustain himself at this high standard. Thus it is that one's acquaintance measurably effects his con-

duct. It is manifestly true that a man well-known all over the country must be more careful of his reputation than one without such an acquaintance. Thus it is that we meet in convention, make pleasant acquaintances, say our kindest words, do our best to show the good there is in us and are forever afterwards anxious to sustain ourselves. This condition is common to all gatherings.

We are inclined to overlook any little wrong which may attach itself to people whom we know well. The misdeeds of people whom we do not know are invariably exaggerated. To this extent the social element of the convention is helpful to us. We are judged in a more kindly spirit.

Through our advanced social relations with our business associates there is the greater intimacy and greater confidence which leads to an interchange of experience. We swap ideas, and we are not too particular about its being an even trade. We give and take in a spirit of high friendship, and in the end all are mutually benefited. We get new ideas, and as we start from the convention to our homes, we find that we are in a larger world. Larger in all that is material, broader in our charity and full of good hope, all of which tends to our material and moral advancement. It makes us better men in business, men of more value to the world and hence to ourselves and our families.

A WORD OF WELCOME.

A neighbor of ours once invited a large number of friends to a Christmas dinner. His wife had labored hard in getting an elegant feast. Everyone sat down to the table in buoyant spirits. They left it satisfied. As the last guests were departing the gentleman, who was all good nature said: "Well, my friends, I am always glad to welcome you, we are always glad to have you with us, but, sincerely, I am always just as glad to see you go." This applies very well to a heavy Christmas dinner, but not, as we understand it, to a gathering or convention of clayworkers. We do not remember to have attended a convention where we were glad to go or see anyone else go and we feel that this is no exception. While the CLAY-WORKER does not in any sense feel that it is the host of the fifth annual convention because of its being held in the city of its publication, yet we have done, and will do, all in our power to make the meeting a success and wish to have it understood that our

work is distinctively for clayworkers and that we are subject to all just demands.

CONVENTION WORK—WHAT MIGHT BE DONE.

Much of the experimenting that is done at great expense by each clayworker for himself might be done by the body of clayworkers at a trifling expense to the individual member. An experimental plant, owned by the National Association could do many things for the benefit of the members of the body which they as individuals have to do for themselves. A great deal of this sort of thing has been done by the French government for its own people. It conducted expensive experiments in flour milling several years ago and saved to the people the millions of dollars which it cost those of the United States to do the same thing as individuals. There is no use talking about getting our government to do anything of this kind for the clayworkers. Its work has never been done along this line excepting in case of agricultural work. The possibilities of the clayworker would be much enlarged by something of this kind and we cannot but see that it would be of great general benefit. There are very few extensive clay-workers but have ideas that they would like to see tried, but which in the nature of their work could not be fairly undertaken, both on account of expense and the time that it would take from ordinary affairs. The manufacturers of clayworking machinery would, no doubt, be glad to place some of their outfits where they could be viewed by those who cared to see the results. Particularly would this be true if power and buildings could be furnished by the General Association. A work of this kind should be carried on under the direction of a committee who would receive from the outside such ideas as would be proposed and decide on what should be undertaken. This work should be in the hands of progressive men of high character, of which there are a sufficient number in the clayworking business. We do not expect to see an idea of this kind jumped at or adopted at once, but submit it for the consideration of those interested.

Our old friend and neighbor, John Hensley, who of late years has been connected with the Memphis (Tenn.) Brick & Mfg. Co., looked in upon us recently, and reported the Memphis brethren as generally prosperous and happy. Several of them will be with us during the coming annual convention.

CONVENTION NOTES.

A convention should furnish food both for reflection and gratulation. Many of our brethren will go home from the annual conclave with a rich burden of ideas; others, mayhap, with few or none. There are some so constituted that they do not learn anything. They cannot feel that the time and money spent in attending the convention is well used. Such men do well to remain at home. On the other hand the inquiring, progressive workers never fail to get some idea or bit of practical information whenever thrown in contact with a fellow craftsman. To such the convention is a feast following which comes the process of assimilation. They think it all over and the more they think about it the more it swells. It is like the earth—the more we know of it the bigger it gets.

* * *

The man who gets the most out of the convention is the one who knew the most when he packed his grip and started from home. The one who gets the least is the one who was barren when he started. He belongs to the ilk that writes an inquiry on a postal card about reburning a kiln of brick or some other question of like character. The mere act of getting away from home, coming in contact with new people enlarges the horizon of any thinking man. The one who "hasn't time" to attend a convention or "thinks it doesn't pay," very often uses time at home which is of very little value.

* * *

One of the reasons why the little personal conversations that occur when the convention is not in session are really the most productive, is because out of a large crowd only a few have the art of talking in public, and hence their often profound knowledge of a subject goes by default. Such a man, however, can tell what he knows in conversation, and this mixing of ideas is as necessary to forming ideas, as it is in forming a perfect brick.

* * *

Among the valuable information one may get at the convention, is the various points of superiority and adaptability of machines to various clays or methods. A machine, from its rigid automatic conditions, is always at its best on a certain clay, or on a clay prepared in a certain way. As these vary almost indefinitely, machines that do well on one often fail in others, or to do well in all, the various kinds must be treated so as

to bring them nearly to the condition of uniformity demanded by machine work. This is measurably true of all machines, and where a large number in a trade get together they are quite likely to represent all the varieties of machines and raw materials, and the exchange of experience on the varying treatment and method is alone worth more than the cost of railroad fares, hotel bills, and loss of time. The best way to do a thing is often best learned in knowing how not to do it.

* * *

This day of railroads, telegraph and rapid communication of ideas and products, where a contractor in Indianapolis may buy his stock in Philadelphia, St. Louis or Chicago, has made it impossible for men to live for themselves alone, or fence himself inside his narrow locality. Just as securely as he may fence himself in, he also fences himself out. It is an age of small profits on a large output, made in the most wholesale or economical way, rather than large profits on a small output, made in primitive fashion. This is a condition of success, and men must broaden out to the range of their possibilities, and learn of the wants of the world, as well as to the best methods practiced in it; and for this reason conventions are a prime necessity.

BUTTONHOLE TALKS.

The assembling of men of a given trade in convention has an undoubted effect. It adds dignity, precision and executive force to the individual who is clothed with the power of the whole body. But where the individual is most directly benefited is in his meeting other members "out of hours," conversing with them in a snug seat in the hotel corridor, or taking a walk or ride while they discuss trade, swap misery and cigars. Personal conversation is the most agreeable way of getting well acquainted, and the most effective way of getting information. When one talks with a well informed person, one finds him at ease. He then gives you his views in far better form than he will express it in a formal speech on the convention floor. You can ask questions, and have them explained, and you go over a subject, both imparting some peculiar experience, and each learning something from the other. These personal, informal conversations are usually unconscious, and very often life-long friendships are formed out of these casual, but mutual, mind refreshing ex-

changes. While we do not depreciate in the least, the value of the "session," we hold that the real "moral reform" is worked in the by-ways, where men not only exchange their knowledge, but what is more valuable and lasting, their mutual and personal confidence, more or less lasting and sacred, as they may be mutually attracted toward each other.

HE WILL BE WITH US.

Every assembly has its objector. The National Congress has more than one. He is the man who is the stickler for the red tape. He is the one who is constantly rising to the point of order. He is present in all conventions and will be present at ours. He is always on hand. Nothing can be said that will disconcert him. We often wish somebody would sandbag him, but he is the first man to come and the last one to go. He arrives at the hotel, grip in hand, wreathed in smiles, in the best of humor with himself, laughs at his own jokes, gets the best room, stands treat less than anybody and is continuously in a happy frame of mind. Particularly is this true when he rises to a point of order and makes a speech in support of himself. He glances around the room and never fails to imagine that he catches admiring glances. He has something to say on all subjects and is greatly disturbed when anyone justly objects to any measure or action of his. We all know him, we have seen him at every convention that we have ever attended and we believe that he will be the last man lost to things earthy before the millenium. The objector will be the last man to leave and when we go we will have eternal happiness.

BRICKMAKERS' MANUAL.

We have now ready for delivery a new and very valuable book entitled, "Brickmakers' Manual," by R. B. Morrison, compiled and arranged with additions by J. A. Reep. It is an illustrated handbook for ready reference, and as a practical and exhaustive work on brick-making is undoubtedly the most valuable book ever published. The author, Mr. R. B. Morrison, is better known to the readers of the CLAY-WORKER as "R. Brick," author of "Hints on Brick-making." The book is a compilation of "Hints" with much additional matter carefully classified and arranged. It is handsomely bound in cloth, with gold title and embraces over two hundred pages. Sent postage free on receipt of price, \$3.00. T. A. Randall & Co., Indianapolis, Ind.

TOO MUCH FOR ONE BED.

Editor Clay-Worker:

I herewith submit letters from two of our mutual friends, received in reply to inquiries sent the writers sometime since, in behalf of the National Brick Manufacturer's Association, which is soon to meet in your city. These letters are therefore the property of the Association. The first, that of Mr. Oldfield, is valuable to the craft as a strong proof of the development of the clay interests in all parts of the Union, and, more especially, in the South. It is an indication of the advance that modern improvements are bringing about. Not only this, but it indicates a rapid approach to the use of the same terms to express the same ideas in different localities. Our esteemed friend, Mr. Oldfield, has had a wide experience, and, no doubt, can give us some valuable information on the subject.

As to the second letter, that of Mr. Pike, of Illinois, it is submitted, first, because of the information in the first part, and second, because of the absurdity of the propositions in the second part. While I am glad to state that Mr. Pike and myself have always been and now are on the very best of terms, yet I trust I may be spared complying with his request—tried it once in a much colder climate, and will refer all just persons to Mr. J. J. W. Billingsley for further information.

When you write him please enclose stamp.

W. A. EUDALY.

Cincinnati, Jan. 7, 1891.

BRICKYARD NOMENCLATURE.

W. A. Eudaly, Cincinnati, O.:

DEAR SIR—Yours of the 26th inst., was duly received, and, as you requested, should have had earlier attention had it not been that I was absent from home. As to the "Nomenclature" of brick-making or of brickmakers, I confess at the outset that although I was born and brought up in the midst of clay and clayworkers, yet I hardly know where to begin or what to say. My experience has principally been along the Hudson river and in "Tidewater," Va. Perhaps the language of this section will be the more novel and therefore I will confine myself to what "I know" about that kind of dialect. To begin I find "De Wah" made quite a difference. The machine a still greater and the "schoolmarm" is rapidly doing away with all traces of the olden time. "Old Black Joe" used to cut his clay by tasks and "spits." He now cuts by "cubic yards." I should say, however, that this is done by young Black Joe, who is quite a different person. The old man "toted" and rolled the brick; the young man "carries" and "wheels" them. The old fellow, the old temper, used to make a "pone" to "slick up" its sides, "put it up" for the moulder, the young one puts up a "bed of mortar" for the moulder's use. The moulder used to "plane" off the brick, he now "strikes" them off. Of course you will understand that these are identically the same operations—as the clay on the seaboard is weak, there was nothing but common brick made here and therefore the names of them

were quite few and simple. "Run of kiln," "mer chantable," and "two and one" are used as terms to distinguish building brick. "Hard" where no "salmon" or "soft brick" were used and "paving" when they were required for that particular purpose. Rarely "sand stretchers" were made and they were so called. The brick before the war and until quite a recent date were made by hand strictly; so much so that even clay was tempered by hand with a common spade. As I remarked at the outset, there is little to be said on this subject that is not expressed by language in common use so far as I know, but I have given the foregoing as the best help I could. Trusting that you will accept the will for the deed in what I have been able to say, I am,

Very Truly Yours,

GEO. S. OLDFIELD

Norfolk, Va., January 3, 1891.

NOT INTENDED FOR PUBLICATION.

MY DEAR EUDALY:—Your letter of interrogation of 18th inst. at hand. I think you are just the man for this position. We, in this vicinity, make only common brick, such as those made on tile mills and slop and sand brick. "No headers," except they get them from bicycles—No stretchers, except they get hitched on to the end of a rope. We just call them brick. Sometimes we have other kinds of brick, usually carried in Sucker's hats. Say: can I sleep with you if I go to the National Convention? This is all I know.

Your friend.

Chenoa, Ill.

E. M. PIKE.

WITH UNBIASED EYE.

One of our ablest contributors is just now traveling in Europe. In making this trip he claims to have left his patriotism behind him. He has not gone abroad to tell the people of the old world what a splendid country America is or defend it single-handed against all comers, but rather to learn all that may be found in his path which is of interest and benefit to Americans. It is only too common that our travelers in foreign lands are prone to make comparisons between the good which is in America and the bad which is around them. The American can do most for himself and his country by seeing the good and disregarding that which he does best at home. It is not what the Americans do well that our scribe wishes to see while abroad, but rather what the foreigners do well. We will present in the following (February) CLAY-WORKER an interesting communication from Mr. Gibson, which indicates that he is greatly delighted with some things in the way of brick work which he has seen. We happen to know at the same time that he is quite enthusiastic as to what Americans do, as brickmakers and clayworkers, and that he believes that they are generally in advance of foreigners in this work, but wherever it is possible to pick up details which are of value to Americans, we have no doubt but that our contributor will do it utterly without regard to his feelings as an enthusiastic American.

VITRIFIED BRICK—A NEW PROCESS.

The *Brooklyn Times* is authority for the following:

A factory is already in operation at Bellport for the making of vitrified brick. This factory stands on Smith avenue, north of the depot. It is said to be the only manufactory of its kind in the world, and at present the bricks made therein are looked upon as experimental. In the making of these vitrified bricks the process is very simple, namely: Take soft sand that is not made up of quartz, gravel and crystals, melt in a mass, then pour the liquid into iron moulds which are 18 inches long, 13 inches broad and 12 inches deep, and when cooled the bricks are ready for use. It is said the coal thus far used is not productive of the needed intensity heat often melt the mass sufficiently, yet ultimate success is assured, and for the present an artistic sample lot of these brick can be seen in the new railroad depot just nearing completion on Dunton avenue, some distance west of the present Bellport station.

THE COMING NATIONAL BUILDERS' CONVENTION.

Preparations are being made on a large scale for the fifth annual convention of the National Association of Builders, which will be held in New York City, February 9th to 13th. This meeting of delegates from builders' exchanges located in all parts of the Union is an event of great importance to all builders and contractors throughout the United States.

The pleasant duty of entertaining the delegates, of whom there will be about six hundred, falls upon the New York Builders' Exchange. A committee of a hundred has been appointed to take the affair in charge. To facilitate matters it has been divided into smaller committees. The executive committee consists of Marc Eidlitz, chairman; Stephen M. Wright, secretary; A. A. Cowen, F. E. Conover, J. M. Canda, Richard Deever, I. M. Eidlitz, R. C. Martin, H. W. Redfield, G. M. Smith, W. C. Smith and J. J. Tucker.

Every evening of the convention will be filled with some special entertainment for the visitors. The whole programme has not yet been announced, but it was learned that one evening will be devoted to a grand banquet and another to a theater party, for which purpose some theater will be chartered and appropriately decorated. The Building Trades' Club will keep open house while the delegates are in the city.

HUSTLE.

Don't wait for trade;
 Don't stand around and expect business to build itself;
 Hustle, push, wake up, advertise.
 Keep stocked up with the best;
 Keep prices down as low as possible consistent with a fair profit;
 Be prepared for every demand;
 If you don't have what is asked for, get it;
 Advertise!
 Keep the best stock;
 Try to beat competitors by having better goods,
 At fairer prices;
 Always be courteous and ready to oblige;
 And Advertise.
 Keep the store clean;
 Make it attractive;
 Have polite and attentive clerks:
 "Sugar catches more flies than vinegar;"
 A pleasant word will often bring back a customer.
 "Never weary in well doing;"
 Never tire in attending to the wants of customers;
 Whether they buy or not, ask them with a smile to "come again;"
 Be prepared to supply their needs;
 And advertise.—*Confectioners' Gazette*

EDITORIAL NOTES and CLIPPINGS.

Range, Texas, is to have a brickyard.
 Emmetsburgh, Ia., wants a brick plant.
 Floresville, Tex., is to have a brickyard.
 The Fostoria (O.) Brick Co., has been organized.
 A large brick plant is to be erected at Alamosa, Col.
 A brick plant is to be established at Colorado, Texas.
 A large brick plant is to be established at Piedmont, Tenn.
 J. C. Schrader will run a brickyard at Onkama next season.
 Mrs. Wickers, Lamoni, Ia., will make brick there next season.
 John Clark, brickmaker, Millis, Mass., has gone into insolvency.
 Wm. Grothe and Frank Myers, York, Pa., will erect brick works.
 The Kirkland (Wash.) Steel Co., will probably start a brick yard.
 A co-operative brick company is being organized at Biddeford, Me.

Jacob Daniel, one of Detroit's oldest brickmakers, died the 3rd inst.

Mayor Stewart, of Dubuque, Ia., is thinking of going into the brick business.

Crouch & Harding, Carrollton, Mo., propose to enlarge their brick works.

C. A. Reed and Chas. Bradshaw, of Rootstown, Ohio, will start a brickyard.

The Ravenna (O.) Brick & Tile Mfg. Co., has been incorporated, capital \$15,000.

The Port Falls (Wash.) Brick Co. will enlarge their plant for the coming season.

A large and peculiar deposit of valuable fire clay has been found near Cloverport, Ky.

A company to manufacture pressed brick at McClosky, Mo., has been organized.

Bridgeton, Ind., is thought a good point for the location of a small brickyard.

E. N. Weigel, Little Rock, Ark., contemplates starting a new brick works there.

Holliday & Fletcher, Cairo, Ill., are contemplating enlarging their brick works.

An effort is being made to organize a brick manufacturing company at Superior, Wis.

Peck Martin & Co., Ft. Smith, Ark., have made an assignment. Liabilities, \$1,000,000.

The Lyons (Ia.) Pressed and Paving Brick Co., has been organized with capital \$50,000.

Gruger & Pace and S. Fleming & Co., are going to engage in brickmaking at Albany, Ga.

J. Best, of Kansas City, Mo., and others will establish a paving brick plant at Argentine, Mo.

Thos. Diamond, of Wauwatosa, Wis., is organizing a company to establish a brick plant.

McClurkin, Ochiltree & Co., Morning Sun, Ia., are intending to enlarge their brick plant.

T. S. Gerhard and others, of Cleveland, Ohio, are building a brick plant at Independence, Ohio.

Thos. Finnegan, of Haverstraw, has leased land and will make brick at Cocymans, N. Y.

The terra cotta works of Tracy Bros., San Francisco, Cal., were burned recently. Loss, \$70,000; insurance, \$4,000.

The Diamond Brick and Terra Cotta Co., Kansas City, Mo., has increased its capital from \$50,000 to \$100,000.

Washington, Pa., is paving its streets with brick furnished by the Pittsburgh Fire Brick Works, at \$13.50 per 1,000.

C. L. Alexander & Co., Palmer, Mass., will put in an artificial dryer and enlarge the capacity of their brick works.

The Higgings Brick & Tile Co., Beaumont, Texas, has been organized and will soon get machinery up ready for work.

Those who want experienced help can find it easily by making their wants known in the "Wanted" column of the CLAY-WORKER.

E. N. Conkling, formerly of the Philadelphia Terra Cotta Co., is organizing a company to manufacture terra cotta at Chattanooga, Tenn.

The output of Chicago brickyards for the year 1890, according to the *Tribune*, reached nearly 600,000,000, representing in value \$4,300,000.

E. C. Gano, formerly with the Mackey Brick & Tile Co., of Calaveras, Texas, has taken the superintendency of the Newbern (Ill.) Pressed Brick Co.

The Central City Brick and Tile Co., Peoria, Ill., is in the market for about 70 drying cars, new or second-hand. They are enlarging their works.

W. L. Shank and D. Cavanaugh, South Bend, Ind., have formed a brick company and will make brick on an extensive scale during the coming season.

The past season was a very successful one with the brickmakers at Knoxville, Tenn., and the prospects are very good for a still better business during 1891.

The New York brick market is reported as very dull, prices for Haverstraw hard ranging from \$5.50 to \$6 per M. Pale are not wanted except for special orders.

F. G. Lotterer, of Fort Scott, Kan., wants to buy cars for a steam dryer, also two self-cutting tables for end-cut brick, and 4,000 to 6,000 feet of 1-inch or 2-inch steam pipe.

The defunct London Mills (Ill.) Brick and Tile Co.'s plant will probably be taken in charge by a new company, overhauled and put in operation again in the spring.

Van L. Hampton, Secretary of the Colchester (Ill.) Improvement Association, whose "ad." may be seen in another column writes under date of January 5, "We are receiving better returns from our "ad." in the CLAY-WORKER than from any other of the eight or ten papers we have tried."

Pellegrini & Castleberry, of Atlanta, Ga., intend to enlarge their business in the spring and will want to buy one pug mill and engine and one crusher to grind old terra cotta and fire brick.

The Purington Paving Brick Co., of Galesburg, Ill., have erected ten Eudaly Kilns, of 200,000 capacity, the past season. They have burned about 3,000,000 brick and, so far, have not had a bad burn.

Anthony Ittner, of St. Louis, has ordered one of the new 15-ton Andrus 4-mold Brick Machines for his new works at Belleville, Ill., a cut of which appears in this number of the CLAY-WORKER.

Good, practical, reliable workmen are always in demand. Those competent to superintend and manage brick works can readily obtain desirable situations by making proper announcement in our "Wanted" column.

Fletcher & Thomas, Indianapolis, Ind., shipped the first of this month, four car loads of Brick Machinery and Brickmakers' Supplies to Zacatecas, Mexico, to fill an order recently taken by their traveling man, Mr. J. W. Hensly.

William Hilton, of Dunkirk, N. Y., writes that he will be ready for the spring trade with a new Horizontal, all iron Brick Machine, that will take the lead of all machines of that class, as it is being built on entirely new principles.

The Smithville Pressed Brick Co., of Smithville, Tex., which has been in the market for some time past for brick machines, has purchased the Improved Lion Brick Machine, capacity 30,000 per day, from the St. Louis Iron & Machine Works.

Many manufacturers are now arranging for various improvements in their works for the coming season. The putting in of new machinery of larger capacity will leave them with small machines and appliances that are to all intents and purposes as good as new, which may be easily disposed of by a small "ad." in our "For Sale, Wanted, Etc.," column.

Fallston Fire Clay Company is the name of a new company which will erect a plant for the manufacture of paving and fire brick from the celebrated clays of "Brady's Run" Valley. Hon. H. Hill, of Beaver, Pa., G. T. Kennedy, New Brighton, Pa., W. J. Stewart and others, are the company. Their address is Fallston Fire Clay Co., Fallston, Beaver Co., Pa.

Jonathan Creagers' Sons write that they are now furnishing a third outfit to

the Evansville (Ind.) Pressed Brick Co., two heavy Pug Mills with No. 2 Disintegrators to Garig-Reddy Co., Baton Rouge, La.; Machine and Disintegrator to Suhrheinrich & Bro., Evansville, Ind.; an outfit to Monterey, Mexico, and that they consider the prospects good for the coming season.

Mr. A. R. Root, formerly of Wilkes Barre, Pa., now the eastern representative of C. W. Raymond & Co., of Dayton, Ohio, with headquarters at Washington, D. C., called at our sanctum recently. He is familiar with the brick interests of Virginia and adjoining states and thinks the coming season will be one of the most prosperous for the brickmakers of that section that they have ever known.

Fletcher & Thomas, Indianapolis, Ind., report this January 2nd to commence the new year with a sale of one of their Complete Combined Steam Brickmaking Plants, including a 30 horse-power Atlas Engine and Boiler to the Grottoes Co., Shendun, Va., one of similar character in Texas, one in Illinois, one in Louisiana and one in Florida. They say the outlook for the coming season in their line is far better than last year.

A Louisiana subscriber writes: "Are you personally acquainted with a good, sober, industrious and competent man, desiring a situation as superintendent; one skilled in burning brick and competent to handle labor—all negroes?" If any of our friends who feel that they can fill the requirements with such a position, we will gladly put them in communication with our subscriber, who is contemplating the erection of a new steam plant to manufacture common and red building brick.

The Joseph J. Kulage celebrated "Triumph" Dry Press Brick Machines from St. Louis, Mo., are creating more than usual interest among the progressive brickmakers. During the last month, these machines were shipped to leading brick manufacturers in the States of Colorado, Georgia and Wisconsin, and are intended for making fine pressed "Face" or "Front" bricks, which can be made on the "Triumph" with less than 10 horse-power and set directly from machine into the kiln, at the rate of 30,000 per day.

Colchester, Ill., is rapidly assuming large proportions as a clay manufacturing center. Several extensive brick works, potteries, sewer pipe and fire proofing plants have been established there and more are to follow. They

have inexhaustible deposits of excellent clay, and abundance of water, cheap fuel and fine shipping facilities, which, backed by liberal and enterprising people, will certainly make it a great clayworking center. Special inducements are offered to experienced manufacturers desiring to establish works of any character. Van L. Hampton, Sec'y. Colchester Improvement Co., will give full particulars.

The Cincinnati Corrugating Co., of Piqua, Ohio, report having had a very satisfactory business during the year just closed, and the outlook for the coming year brighter than ever. Brickmakers and tile men know from experience that their corrugated roofing and siding is of a kind peculiarly adapted to their needs. It is easily applied, durable, and makes a very satisfactory building for kilns, etc. One of the specialties of this concern is metallic lath advertised on another page of the CLAY-WORKER. This lath is of sufficient stiffness to give the wall increased rigidity and at the same time perforated enough to enable the plaster to be properly "keyed." When in need of anything of this kind it will pay you to communicate with them.

Our Philadelphia correspondent writes that the outlook for the coming season is more encouraging. Work seems to loom up ahead in great plenty. The price of certain grades of brick have gone up since the first of the year about \$2 a thousand.

At the regular meeting of the Brick Manufacturers' Association, held on December 11th, the following resolution was adopted: That the price of hard brick be \$9 per thousand, whereas the Director of Public Works has required nothing but straight, hard brick or third quality paving brick shall be used in the construction of sewers, it is resolved that sewer brick be \$11 per thousand after January 1st, 1891.

The entire Association of 54 members will attend the National Convention to be held on January 20th and 24th at Indianapolis.

HANDLING CLAYS

The cost of handling the clay from the bank to brick machine can be very materially reduced by the use of proper hoisting machinery. Much light on this subject can be gleaned from the new catalogue of the Lidgerwood Mfg. Co., 94 Liberty Street, New York City. The book is the handsomest machinery catalogue ever seen in this office, and is a valuable book of reference. Send for it, it is designed for free distribution.

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A GROWING INDUSTRY.

The paving brick industry has shown no abatement; on the contrary, it is taking on larger dimensions every year.

To keep up with the demands and to supply the manufacturers with the necessary improved machinery, the Frey-Sheckler Company, of Bucyrus, Ohio, are constantly at work to construct new devices and machinery for the purpose.

A new crusher with a wrought iron frame is now being constructed for the purpose of reducing the softer shales, also cutting-off devices, especially of the Automatic kinds.

Two styles are now being made, one to cut side-cut brick and to carry the cut brick away from the machine with a traveling belt which can be made of any length. The other is an Automatic Board Delivery Table where the brick, twelve in number, are placed on the board by the machine and then shoved forward, from whence they can be readily removed by the off-takers.

Their different machines in use all over the United States, although not provided with the latest improvements, are constantly supplying the market with brick that are unsurpassed.

The new catalogue will be ready about January 10th, 1891.

By writing to the FREY-SHECKLER Co., Bucyrus, Ohio, this can be obtained.

See ad. on page 87.

THE CLAYWORKER.

VOL. XV.

INDIANAPOLIS, IND., FEBRUARY 15, 1891.

No. 2

Written for the Clay-Worker.

EXAMPLES OF AMERICAN BRICK AND TERRA COTTA WORK.

No. 35.

TERRA COTTA THE BEST AND MOST DESIRABLE ARCHITECTURAL DECORATION.

The terra cotta industry is entering a new field. We do not mean this in an experimental sense, for that era is passed, but the commercial development of terra cotta as a medium of adornment or decoration. Much in this way has been accomplished. Art forms are created in large quantities and of pleasing character that is making this material more and more popular, and yet this part of the industry is in its infancy. In the near future these products will be cheapened. Mechanical devices will be introduced to expedite the work, and the time is not far distant when even the humble cottage may be ornamented with decorations now found only on the houses of the wealthy. Terra cotta is now being produced cheaply, compared with other durable forms of decoration. Its very popularity is bound to result in further cheapening its manufacture, and stimulating inventions for its more rapid and economical production. The business man is quick to respond to a demand that has in it promises of stability, by working to fill such demand and fill it so that all who demand can afford to buy. There is profit in quantity at a cheap rate, where it would be absolutely lacking if the product is limited, and the man who can accomplish cheapness and yet retain profit, owing to his much larger production admitting economies impossible to the smaller one, will be the one to make an enduring success.

We do not say that this tendency is altogether pleasing. Rather, we prefer to see many smaller manufacturers pros-

per along together, but we are bound to admit that this tendency has invaded every other department of industry, and can see no reason why this will be an exception. It may be that this condition will not come by concentration and that inventions may enable smaller makers to hold their place, but if so, it will be contrary to the present spirit. But, however this may be, the industry is certain to receive great stimulus from the rapidly growing appreciation of all classes for art forms in terra cotta that will extend in direct ratio as



STABLE WINDOW MADE BY THE INDIANAPOLIS TERRA COTTA CO.

they are brought within the reach of the masses.

ORDINARY bricks are about 8 inches in length, and with the mortar joint about half that width, so that each brick, on the flat, will give a horizontal surface of about 32 square inches, or $4\frac{1}{2}$ bricks will cover a square foot. As ordinarily laid, there are 9 courses to every 24 inches, or $4\frac{1}{2}$ to the foot. $4\frac{1}{2}$ courses, with $4\frac{1}{2}$ bricks to the course, will give $20\frac{1}{4}$ bricks to the cubic foot. Waste, cutting and closer joints will easily require an allowance of 21 bricks per cubic foot, which will be

found a very convenient figure for estimating the number of bricks required for a wall of given height and thickness, as it thus becomes unnecessary to find the cubic contents of the wall, but merely to multiply its face area, or the product of its length and height in feet, by seven-fourths of its thickness in inches, which, as the thickness is always some multiple of 4 inches, is a very simple process.—*Ex.*

THE EFFICIENCY OF CHIMNEYS.

An old chimney, 67 feet high, with internal diameter 19.6 inches to 13.8 inches, and with total passage, from fire to chimney top, of 98 feet, was taken down and a new chimney, with intended total height of 95 feet, and a minimum internal diameter of 25.5 inches was planned out. When the chimney had gone up 39 feet it was tried. Already there was a great improvement on the old chimney; again at 46 feet it was much better, and at 52½ feet the draught was excellent, the smoke issued clean, without soot, and there was an economy of from 15 per cent. to 20 per cent. in fuel. So the chimney was finished off at that height. Herr Huth thinks that chimneys are usually made too narrow, and the mischief is aggravated by increasing their height, so that fuel escapes unburned. Herr

Ramdohr, of Gotha, confirms this, and recommends a uniform internal diameter as being more rational, and as protecting the brickwork from the hot and rapid axial stream. The cross section of the chimney should be one-fourth to one-eighth the grate area, and the height not less than fifty feet, should not exceed 100 to 120 feet (the diameter being made to suit) unless the chimney is at a distance, in which case it may be 160 to 200 feet, the diameter being regulated according to the amount of soot which escapes.—*German Trade Paper.*

Written for the Clay-Worker.

BRICK PAVEMENTS—SOME OF THEIR ADVANTAGES.

BY D. W. STOOKEY.

While the superiority of brick for paving purposes is well known to many, there is yet much discussion between the members of city councils as to the kind of pavement best suited to their purposes and best adapted to their peculiar circumstances. To him who has carefully and fairly investigated the merits of brick there is no longer a question, but as all who are concerned and directly interested have not given their time and attention to the subject it will possibly be of interest and profit to collect and formulate the many points of excellence that are found to be possessed by well burned brick for street paving purposes.

Like everything else, paving brick have met with opposition and have been brought into competition with other materials and only after years of trial have they been able to gain the position in public favor to which they are justly entitled and this has been fairly won against conservatism, prejudice and competition. Some of the good qualities which they have shown through years of critical and often unsympathetic trial, have been gathered and presented in the following paragraphs:

The regular form and uniform size of brick permit them to fit closely together at the sides and ends and each one thus acts as a support for those adjacent. The filling of sand soon becomes thoroughly packed into the joints, thus making a compact, water tight surface. The arched section of the street not only sheds the surface water into the gutters, but by receiving the weight of the passing teams and vehicles, aids in keying each brick more firmly into the arch, thus tightening the joints and increasing the bond of mutual support existing between the brick.

Smoothness of surface is obtained by the uniform size of the bricks together with their small size and the smooth foundation. The effect upon any pavement that has joints in it is that the horses' shoes will break chips from the edges of the blocks or pieces. This chipping away of the edges and corners while the middle does not wear down as rapidly, will, in time, give the pavement a rough surface similar to cobble stones. The larger the blocks and the broader the surfaces the rougher and more un-

satisfactory the pavement becomes, as it gets older and more worn. The small exposed surface of common sized brick set on edge, very materially obviates this objectionable feature and prevents the roughness and irregularity with their attendant unsatisfactory footing for horses.

No jolt is felt from the smooth surface of small pieces and consequent short distance from one to the next, but instead a pleasant, humming sensation is transmitted to those riding over brick pavements. Elasticity, from the slightly yielding bed of sand, is felt under the hoofs and wheels instead of the unyielding shock so noticeable in stone pavements.

Slippery brick pavements are not known so far as we can learn. Owing to the small surface of each piece exposed the seams or joints are close together and afford frequent places where the feet of horses may hold. Brick do not admit of a polish, but present a velvety or sand paper like surface and experience teaches that horses very seldom slip on brick pavements even in winter. Being very poor conductors of heat, ice does not adhere to brick as it does to stone and many other materials. They are easy on teams and vehicles. Being smooth, the horses' foot strikes on a level and is not subjected to unnatural strains; being velvety and not slippery, they afford a good foothold somewhat elastic and free from jolt or shock. Vehicles are not injured and horses can draw much heavier loads than upon rough, slippery pavements.

Almost noiseless, being smooth, elastic, free from jolts and since brick is a very poor conductor of sound, they do not present that noisy, metallic ring so annoying on stone. They are clean; being smooth, they are easily cleaned and the tight joints prevent dirt from gathering or mud from working up from below in wet times. As the wear of the pavement itself is not appreciable, no dirt results from this source. They are easily taken up and relaid for putting in gas and water pipes, sewers, etc.

Owing to the plan upon which they are built, it is not necessary to disturb the pavement over a much larger surface than that required for the actual excavation. If the filling in the trenches is thoroughly rammed, the pavement can be relaid without showing any appreciable variation from the general surface. In case the disturbed place should sink after a time it could be very easily raised

and relaid. Repairs are easily made and at small expense as compared with other pavements. The foundation layer will be intact and many of the top brick will be good so that a renewal of the pavement after a term of years will only involve the top course and will be comparatively inexpensive. The foundation is practically everlasting and when a brick or a spot gives out it is only necessary to insert new brick into the top course and the pavement is as good as new. The material for repairs is always at hand and easily obtained.

The durability of pavements made of good brick is no longer questioned by those have given the subject proper consideration. Even hard burned red brick have stood the tests of at least fourteen years and have given good satisfaction with but slight repairs in Charleston, West Virginia.

The money may be kept at home by manufacturing the brick at home. The position that clays suitable for manufacturing paving brick are only found in a few favored localities is not well taken. By utilizing home products the expense of freights is saved and the money paid the laborers, which is by far the largest item of expense in brickmaking—is nearly all expended with the home merchants and thus home industries are patronized and home interests served.

Brick pavements are the cheapest that are known at present when durability, repairs, the abundance of the material in nearly every section of the country and the fact that the money may be kept at home are considered.

As a sanitary paving material brick is eminently superior to many others. It does not itself decay and being non-absorbent, with a water-tight surface, it does not retain the liquid filth of the street to be afterwards given off in poisonous malarial or typhoid germs so well known to be injurious to health. The aggravation of acute and nervous diseases consequent upon the noisy traffic of paved streets is very much reduced by the adoption of the comparatively noiseless brick pavement. They are pleasant to drive over, being smooth, with no jolt, noiseless, elastic, not slippery and easily kept clean and free from dust and mud.

The following quotation is a fitting summary of these points of superiority and is rendered from actual experience: "Our street railway lines were paved with your Vitri-fied Paving Blocks some six years ago, I consider it the very best pavement now in use. It is almost

noiseless, free from dust, and has required absolutely no repairs. We have not expended one dollar in repairs to the pavement and to-day it seems to be in as good condition as when first laid down. It is a perfect pavement for driving over, as the horses never slip and the ice does not adhere to the pavement as it does to stone blocks. We have about six miles of the pavement and would not think of using anything else."

NOTES OF TRAVEL



a week after the assembling of the convention, I find myself in the beautiful and bustling city of Nashville, Tenn., I recall promises in the past, and decide to keep

my promises, turn over a new leaf and do what every one of us ought and must do; that is, when our wanderings take us to other towns, call on our brothers there located and thus keep up our pleasant associations. In pursuance of this, have called on our old friends W. G. Bush & Co. at their Union Street office and receiving a generous, genial brickmakers welcome—for the brickmakers all have grow hearts—I have been entertained and shown the sights by Mr. T. L. Herbert and W. C. Bush; our old friend W. G. Bush being at present engaged in eating oranges in Florida, which, while it comes pretty nearly being an excuse for not attending our Convention, still we hope will not keep us from seeing him next year.

This firm bears all the signs of a good stage of prosperity, having a capacity of twenty to twenty-five thousand pressed and nearly one hundred and fifty thousand common brick per day, and as they not only make the brick but lay them in the buildings, we find them very busy men. The numerous buildings I have here seen of their brick and erected by them, are lasting monuments of their energy and push of which they may well be proud, and their several yards bear evidence of thought and study, being neat and clean and very nicely adjusted for profitably manufacturing large quantities of good brick.

Have also visited the yards of J. E. Lesueur & Son, which also bear the marks of prosperity and where important improvements are being introduced; and also the yards of the Fulcher-Dyas Brick Co., well equipped and vigorously managed. The welcome was everywhere hearty and the acquaintance such as I shall, myself, hope to keep alive and ever green.

I have been conducted to the roof of the tower of the Capital, and holding on tight and keeping respectfully back from the giddy edge have had the many points of interest pointed out to me as I took a birds-eye view of this pretty city shut in by hills on every side excepting where the Cumberland winds the silvery thread of its commerce bearing waters around and about this Capital City of Tennessee.

Recalling the Convention and its very many pleasant associations and hearing nothing but regret from those who did not attend, I want to urge that we all make a point of *always* looking upon our brothers when we happen in their cities and of thus broadening the acquaintances which tend so much to cheer and brighten our lives.

I am going further South. I have found one road that does not lead to Rome, and I shall pull my hat on tight and go on that road. And it's not a wagon road either, Bro. Morrison. I shall go down to that fossilized brickyard which knows no machine man—no, it's not run by the ossified man—it's not run at all, and there are barnacles and oysters on the bricks, and I shall fish and be lazy and happy for a short interval and then back to the work.

GATES.

Written for the Clay-Worker.

SETTING PRESSED OR FRONT BRICKS

BY H. BRIX.

In the matter of setting bricks there is as great a difference of opinion, as to which is the right way, as there is in the making or burning.

The object is to set them with spaces between for the fire to reach them on all sides alike; and as the work must be done rapidly and continuously, very often it is performed in a careless or unskillful manner, and defeats the object aimed at.

The proper distance apart should be what is termed a "finger space" between the bricks; as an average, say a half inch; if the spaces are made much less than this, the draft will be slow and the heat

of the kiln will remain in the arches and lower courses and not be diffused throughout the mass in the kiln.

Set the arches with common brick, and on up to the twentieth and twenty-fourth course above the floor; keep that course level and solid as a foundation for the pressed brick to stand on. Set common brick on the outside of the kiln next to the wall all around on sides and ends. The pressed brick are set in the kiln at that point where they are likely to produce the desired shade and degree of hardness necessary without being salmon or soft burned, or burned too hard and be fire-marked, or melted together.

After close observation at many places and of the different methods of setting brick, I think the plan of setting which was published and illustrated in the CLAY-WORKER of October, 1887, by "R. Brick," as being the very best all things considered. Experience as well as observation has confirmed me in this statement.

A little study of the plan will teach one that the bricks are set in the benches, so that the fire is permitted to circulate freely among them, and pass rapidly upward from the bench to the body of the kiln. This allows the bench brick to be all burned hard and not as one so frequently sees, melted on the ends next to the arches and the whole brick worthless because the other end is salmon and hardly any show of fire about it. If the fire is confined in the arches the overhangers must melt and fall down out of the way before draft is secured sufficient to burn the bricks at the top of the kiln. Above the arches set according to length of your bricks, to secure the required spaces. Let that be blocks of three, or eight headers on three stretchers; or any other plan that will secure uniform and sufficient space.

The pressed front brick are set in so many different ways, one hesitates to advise or recommend any one plan. Some place them two bricks facing each other and then reversed and set in blocks, the same as the common brick; again, others set them three bricks high which gives the middle brick two good faces, the others only one. I have found in the neighborhood of Richmond, Washington, Baltimore, and Philadelphia, and also at other points, that the pressed brick were set four high on edge in blocks of three in length, then a course of common brick reversed and another four courses in height of pressed brick. This method gives one half of

all the pressed brick two good faces, and while it seems to be pretty generally adopted, my experience with this plan is, the bricks are very liable to careen and fall over, one tier against the other; this prevents draft in burning, or even after the kiln is burned it creates havoc in unloading the kiln to have the piles of pressed brick drop over one against the other and mar the faces, by breaking the angles, and corners. I have had the best results where I set the bricks on edge three courses high, then reversed with the pressed bricks set in solid, either nine or twelve courses in height, and set so as to have as much fire space among them as among the common brick; the pressed brick being more dense require as much or more fire, as the heat is slow to penetrate them.

The tosser tosses one brick at a time to the setter who sets it directly over the one below without projecting on the sides or ends, as a slight projection will cause a dark line on that edge, which detracts from the beauty of the brick when laid in the wall.

I notice some writer in the CLAY-WORKER advising that pressed brick be set on the flat side to secure two good faces on all the bricks. I wish to point out the faults I have found with that method:

First, the liability to break the upper and lower brick of the pile or tier; as the least inequality on the bearing will throw a strain across the brick on its shortest diameter.

Second, the bricks in watersmoking and burning are pressed out of a true face and are not flat as they should be. They are bulged or rounded.

Third, they are very liable to firemark, particularly in clay that is susceptible to markings.

Fourth, the blocks of bricks are four inches in thickness instead of two and a half, as when set on edge, and much of the fire space is cut off in consequence, and they are harder to burn, as the fire is slow to penetrate the large blocks. I have had bricks set on edge and on flat sides in same kiln in blocks of five thousand alternately; those on the flat side, the blue gas was two days longer in leaving them, and, consequently, nearly two days longer in burning than those on edge.

HE is a real conqueror who has gained a mastery over himself. Many a one is a ruler of other men solely because he has learned to rule his own soul.

Written for the Clay-Worker.

ECONOMY IN FUEL AND LABOR WITH PERFECT BRICK BURNING WITH EITHER COAL OR WOOD.

BY J. W. CRARY, SR.

The only question that now remains of primary importance, in the manufacture of clay goods, and especially of brick, is: What can be done to reduce the cost of burning, and increase the efficiency and quality of burning? However cheap fuel may be, or whatever may be the kind of kiln used, still it is an admitted and self-evident fact, that any certain amount of clay, of a given kind, requires a certain amount and degree of heat, to perfectly indurate and toughen it.

If this be true there are three main things to consider; viz., the kind and condition of fuel, the draft of air for its perfect combustion, and the equal and uniform distribution of heat. If wood is to be the fuel, it may be used to the best advantage for "drying off" a kiln of brick, when it is about half seasoned, but after the "watersmoke" has been cleared off, the wood should be well *seasoned*, and *split fine*, so that it will burn rapidly. The same reason will apply to the burning of coal; it should not be thrown on the *grates* in large lumps, and no more should be kept on the *grates* than will cover them, so that an excess of cold air will not be admitted.

I will not here go into the question of cause and effect on this subject, the theory of combustion is well known by all intelligent persons, and the readers of the CLAY-WORKER will find a very terse and able series of letters in the CLAY-WORKER, written on this subject, addressed to "Dear Will," over the name "*Hydro-Carbon*." I will simply say, that the air, or oxygen in it, is the basis, or cause of combustion, and that the more intimately it is mixed, or combined with proper proportions of *hydro-carbon*, or fuel, the better and more economical and efficacious will be the combustion. If we take a large stick of wood, or large lump of coal, and try to make it burn, we find it quite impossible to ignite and burn it by itself, but if we split it up, reasonably fine, we have no difficulty in making a good, quick fire. So that it is seen, when all the elements of combustion are brought most intimately in contact, the best results are obtained.

THE BEST CRITERION FOR THE RIGHT DRAFT OF AIR.

As a rule, after a kiln is "dried off," and "the fires up," fuel should be added as fast as it will burn, clear, *bright*, and

hot, taking care that there should be no excess of carbon, or coals, on or passing through the grates, for if the coals are not consumed to *ash*, there has not been enough *air* mixed with the fuel to complete combustion. Intelligence, with studied, and varied practical experience, are the only sure guides to the best and most profitable ways of using fuels.

THE EQUAL DISTRIBUTION OF HEAT IN A KILN.

To equalize and distribute the heat in a kiln of brick, is the most essential part of burning. The old fashion, and yet quite common way of heating and burning parts of a kiln at a time, is in any way wrong, where economy and good burning is wanted. It is about as reasonable as it would be for a *baker* to bake one part of his loaf of bread, then proceed to bake the other parts. If a kiln of brick be set so that the draft through and up it or down it, (if a down draft be used) is equal and uniform, then all that is necessary, is, to keep up a regular uniform heat in all the furnaces. After "the fires are up," then the heat in the furnaces, or arches, should be increased to that degree that the "overhangers" will stand without melting, and when any part of the kiln is burned or *settled* to about half of the needed *settle*, that part, whenever it may be on the kiln, should be closed tight with *plating*, or with fine damp clay which is better, and thus the burning should proceed until the whole kiln be all covered over. As the kiln is covered, the use of fuel will decrease, and by the time the whole is covered very little fuel will be needed, until the kiln be *closed*. By this process, fuel, and labor is saved, and a perfect, uniform *burn* of kiln is assured.

I have repeated all this, in substance often before in the CLAY-WORKER, but frequent recitals of important facts are necessary, in public journals, in order to meet the eye and wants of new readers.

A PLEASANT AND PROFITABLE TRIP

COALDALE, ALA., Jan. 27, 1891.

T. A. Randall & Co.:

GENTLEMEN—Enclosed find check to pay subscription account to January, 1892.

The writer retains very pleasant memories of his sojourn in your city during the recent convention and feels that the investment has already paid him a large dividend. With best wishes,

Yours fraternally,

JOHN W. SIBLEY.

Written for the Clay-Worker.

THE FUEL QUESTION.

No. 4.

DRAFT, CLINKERS, ASHES, ETC.

DEAR WILL:—In concluding my last letter I gave you statement of the volumes, or rather, weights of air required to burn solid, liquid and gaseous fuel, and, startling as that statement may appear to you, it may easily be verified by a proper application of the tables and statements already given in that letter. In furnishing you with such apparently wild and sweeping statements, my object lies beyond merely surprising you; the end in view being to impress upon you the necessity of making ample provisions for the admission of such large quantities of air, not forgetting the manner, or form in which it is to be admitted, which was pointed out in my first letter.

The efficiency of the air supply, does not altogether depend on the total area of the openings left for this purpose; *draft*, is also an important factor, quite as important as the area of the inlets for the air, in fact, the two factors seem inseparable, and cannot well be considered apart in determining the air supply. The openings into the ashpit are generally made large enough for conveniently getting out the ashes, and in such cases are usually ample for the air supply too, which for the latter purpose only need to be equal in area to the total area of the spaces between the grates; thus, supposing your grates are 4 feet 6 inches long, with two rows of spaces, each space 2 feet long and $\frac{3}{4}$ inch wide, each grate bar space would then contain an area of one-quarter of a square foot, and 4 grate bars would have openings equal to 1 square foot. This rule, I may say, allows a pretty wide margin, for a fire in proper condition would never have the spaces through the fuel as large in area as the spaces between the grate bars, therefore considerable license may be taken without impairing the air supply, the necessary caution to be observed being, *to confine the friction of the air as much as possible, to that imposed on it by the fuel*. This relieves the draft of unnecessary work; work means fuel, and unnecessary work means waste of fuel.

It may not be generally known, but it is nevertheless an ascertained fact, that the friction of gases and liquids in passing through pipes, or confined channels, increases as the square of the velocity increases; thus, if the velocity is doubled, the friction is increased four times; if

the velocity is trebled, the friction is nine times as much. This rapid increase of friction, may not be in strict accordance with your "common sense" ideas on the subject, but it is a scientific fact, and as such I must ask you for the present to accept it; it has a very wide application, and through ignorance of this one fact, many serious blunders have been made; so in all your calculations for water, steam, air, or gases moving in pipes or tubes, bear in mind the very rapid increase of friction with any increase in velocity. "Draft," is one of the numerous things on which this has a practical bearing, but before dealing with the practical bearing, let us examine the theory of draft, sometimes spelled "draught."

A great many people entertain the opinion that the chimney is an enormous sucker, that continually sucks the air through the furnace, and causes the fire to burn; thus, the whole matters is briefly and satisfactorily (?) explained, and it only reveals a cranky disposition, and spirit of contrariness to make any further inquiries after such a convincing and indisputable description (?). To the thinking mind, however, draft presents other features, not set forth in the above elucidation of it, and it will repay us to look them up and examine them a little. Draft, then, as we examine it, is the current of air passing through the fire and then up the chimney, but what causes this draft or motion of the air? The popular reply would be: "The chimney." Now, correct as this reply may appear, it is not really so; the chimney is *accessory* to the draft, but not the cause of it; the immediate cause of draft, is, *the difference in the specific gravity of the air at the top and bottom of the chimney*. If the air at the bottom be lightened by heating, it will ascend, and so long as this heating continues, the draft will be maintained, but if the air at top and bottom are allowed to become equal in temperature, the natural draft will cease, and the air remain at rest until there is again a difference of temperature between top and bottom of chimney. You can doubtless recall scores of instances, where the draft had to be "started" by burning a bag of shavings, or an armful of straw at the bottom of chimney, this according to some is to drive out the "foul air" by others called "damp air," which they say "stops the draft." Now, strange to say, the air spoken of is neither foul, nor damp, it is simply *too cold* and consequently *too heavy*, to rise, but as soon as it gets heated by

the burning straw or shavings, then it begins to rise, and the draft is started; now keep up a supply of hot air or gases, and the draft is maintained.

Now let us see what is the effect of heating the air, and why it diminishes its weight, or rather, its specific gravity. It is found that by heating air and other gases 1° Fahr. we increase their bulk $\frac{1}{491}$; therefore if we heat them 491° we shall just double their bulk. Now a cubic foot of air at 32° Fahr., weighs 565 grains, but if we heat it to $491+32$, or 523° , a cubic foot will only weigh $282\frac{1}{2}$ grains, or only half its original weight. Why? Because the heat has expanded its volume to double, or two cubic feet, and 565 grains is now the weight of two cubic feet of air instead of one.

I think you will by this time perceive that the chimney is not the *cause* of draft, it assists and modifies it, but does not produce it. A chimney as high as the Eiffel Tower could not of itself cause a draft; moreover it frequently happens that there is a down-draft in a chimney, and it is a very simple and easy matter to produce one in almost any chimney. Thus, then, we dispose of the sucking property of the chimney, and while also depriving it of all claims to the primary causes of draft, we must ascribe to it the indispensable property which we give to rails on the railway; these confine the locomotive and train to the track and guide them to their destination; the chimney does exactly the same thing for draft, and besides this it keeps the ascending gases hot, and projects them with considerable velocity into the cold atmosphere at its top; this velocity increasing with the height of the chimney of course increases the keenness of the draft. Draft may also be increased by increasing the temperature at the bottom of the chimney, and in this way make a low chimney as effective as a high one, but you will easily see you must sacrifice fuel to accomplish it. I do not propose in this letter to deal with the economical aspect of draft, but to confine myself to the theory, feeling convinced that when you have thoroughly mastered the theory, the economical application will be comparatively easy; it will enable you also to remedy defective drafts, without recourse to "guess" and "rule of thumb" practices. Viewing then, draft, as being the continual rushing of air into the furnace, to take the place of some preceding it which has become heated, and by reason of its lightness is now escaping up the chim-

ney, and knowing also that the quicker the heated gases pass up the chimney the swifter will the air rush in and through that furnace, and accelerate every chemical action and reaction taking place within it.

Accepting then the above theory of draft, you will readily see the necessity of keeping passages for such draft, clear of obstructions.

The principal impediments of draft, are, ashes and clinkers in the fire, and soot and dust beyond it. It is well, therefore, to have a liberal margin in the area of your grate, also in the size of your flues, and do not lose sight of the fact that a thin accumulation on the sides of your flues reduces your sectional area with astonishing rapidity; an accumulation of 1 inch thick on the sides of a 20 inch flue reduces its area 19 per cent., and a deposit 2 inches thick will reduce it 36 per cent. of its area. A tubular boiler with 4 inch tubes, would only need a coating of soot one-fifth of an inch thick to reduce its draft area 19 per cent., to say nothing of the waste of heat from the non-conductivity of this thin wall of soot. Brick burners who are obliged to use bituminous coal for burning and "watersmoking" too, know well the detrimental and exasperating effect of such a coating, especially while "watersmoking."

Now let us turn our attention to the obstructions accumulating in the fire; these are, principally, ashes and clinkers—the incombustible portion of the fuel. All coals contain more or less of this unburnable residue, and none are entirely free from it. When this residue melts in the fire it forms clinkers, when it does not melt or fuse it accumulates in the form of a fine powder, which we call ashes. The fusibility of these ashes depend to a certain extent on their composition, or their mixing with other substances which flux them.

Coals with infusible residues, as a rule give the fireman the least trouble, and the best result in the furnace, while clinkering coals invariably increase his troubles, and diminish his chances of keeping up a satisfactory heat.

The percentage of residue, or ashes in coals, is not a reliable standard on which to base their efficiency; a high per cent. infusible ash coal, is often preferable to a coal with low percentage of fusible ashes; and although a ton of the latter may contain 1,500,000 heat units more than the former, no fireman could utilize them on an ordinary grate; in fact, he would easily obtain more heat from the

high per cent. ash coal, owing to it being easier to manipulate; in other words, the removal of the clinkers would entail a waste, greater than the difference contained in the coals; not to mention the hot and disagreeable labor required for its removal. On the other hand, the high per cent. infusible ash coal may be made to yield up all its heat with comparative ease, as the ashes may be removed from the furnace by simply shaking up the fire and the grate bars. No matter, however, in what form the ashes are—powdered or clinkered—they obstruct the draft while in the furnace, by closing up the air passages.

As clinker then, is the most undesirable form of ashes, it will be well to look into the conditions for clinkering, and avoid as much as possible that form of ashes.

I have stated above, that, the fusibility of ashes, to a certain extent, depended on their composition, etc. I will now point out another condition that is also necessary, viz., a certain temperature; when this is just high enough to melt the substance, or substances, it is called the fusing, or melting point of those substances. Now the melting point of solids varies very much, some being so low that we cannot produce cold enough to reach them, while others are so high as to be called *infusible*. As an example of high and low fusing points, within reach, we will take mercury and platinum; mercury melts at 38° to 40° below zero while the melting point of platinum is about 4,500°, these are very high and low, but are by no means the extremes.

I will now furnish you with a few melting points that may be useful to you when the thermometer and pyrometer are not available.

Phosphorous melts at about 110°, white wax at about 150°, water boils at 212°; a mixture of 3 of tin and 8 of bismuth also melts at 212°; sulphur at about 235°, a mixture of 1 tin and 1 bismuth at about 285°; 2 tin and 1 of bismuth about 330° also 3 tin and 2 of lead 330°, 2 of tin and 1 lead about 385°, tin about 440°, tin 1 and lead 1 about 460°, tin 1 and lead 3 about 500°, bismuth also 500°, lead about 630°, zinc 700° to 790°, antimony 810°, brass about 1,800°, silver also about 1,800°, cast iron 2,000° to 2,200°, and gold 2,200° to 2,500°. With the aid of this list of melting points, a long handled iron spoon, and a few grains of the above metals and substances, you will be enabled to obtain approximately the temperature of the hot blast you may supply

to your fires, the waste gases as they pass into the chimney, and numerous other things that will present themselves, in the course of your investigations of temperatures, of course it is a "rough and ready" method, and unsuitable for any purpose requiring accuracy, but very useful in the hands of the practical fireman and superintendent, when absolute accuracy is not requisite, it has also the merit of being simple and inexpensive. I wish also to impress on your mind that, *the melting point of any solid, is also the freezing point of its liquid*. It may be difficult at first to associate freezing with high temperatures, because we have for a lifetime been familiar with one freezing point only, that of water. Now you are aware that the freezing point of water is also the melting point of ice; I want you then to look upon every substance in the same way, viz., that their freezing and melting points are the same.

Let us now return to our clinkers, and their melting points. The ashes of all coals are composed chiefly of silica, and alumina, (sand and clay) these substances of themselves, are infusible at ordinary furnace temperatures, but they are so often allied to other substances, that they become easily fusible. A very small percentage of iron, lime, soda, potash and other substances will flux them, or render them fusible, at comparatively low temperatures. Coals with this class of ashes are called "clinkering coals," and the clean bright look that they often carry, only serves to deceive us as to their real character and composition. You must not rely on a test of coal made in your stove, or open grate at home; it might be highly satisfactory there, and very disappointing in your furnace, or under your boilers; the temperature of your stove or grate might be well below the fusing point of the ashes, and the ashes would consequently be in the form of dust, or a fine powder; whereas your furnace temperature would be high enough to melt the ashes, and make them run in a thin sheet of lava all over your grate bars; this is the kind of clinkering that is so annoying to a fireman, and so detrimental to good draft. This evil may often be mitigated and sometimes entirely overcome by a judicious use of the damper; a few trials will soon enable you to decide how much your damper may be closed without impairing the efficiency of your fire, and when you have reached that point, you will often find your clinkering abated, if not entirely prevented, and the coal that

was yesterday pronounced to be so bad and unsuitable, is to-day found to be after all, a tolerably good and satisfactory coal. I hope you see the point in this, but remember, it is a rule hampered by exceptions, and beset with "if's."

Before closing this letter, I wish to point out to you, that draft may be impeded as effectively by reckless firing, as by clinking on the grate; you have only to get your fireman to put on a very heavy fire of small coal, and you completely seal up a large portion of your spaces for draft. I must also direct your attention to the fact, that clinkers, slates, and stones in your fuel, are not merely incombustible substances, giving out no heat, but they all *absorb* heat, obstruct draft, and in a fire are an unmitigated nuisance.

Now take out your note book, and put down the list of melting points given above; remember also what I have stated about the *cause* of draft, and the rapid increase of friction with the increase in velocity of gases and liquids; remember too, the increase in bulk of gases with any increase of temperature. It will be practically near enough, and easier to remember, to say, it doubles in bulk for each increase of 500° Fahr.

Think well over the relation between the chimney and draft.

Remember under what conditions clinkers are formed, and try to familiarize yourself with the paradox, of *freezing points at, and above white heat.*

Yours paternally,

HYDRO-CARBON.

BRICK AND BRICKMAKING IN EUROPE AS VIEWED BY A CLAY-WORKER SCRIBE.

Glasgow is not a brick city, yet there is not a little to be learned about the use of brick from a manufacturer's standpoint. Most of the buildings, however, are of stone. They have not had sufficient fire lessons here to teach them what may happen in case of a large conflagration. Terra cotta is used to a limited extent for copings, but only occasionally in building work. There are some very beautiful brick buildings here. They are designed, for the most part, in the pure Queen Anne style, or that of the Elizabethan period. Be it known that the Queen Anne, as used here, is quite different from much that we are directed to call Queen Anne in America. Queen Anne architecture and that of the Elizabethan period is so easily studied here that it may be

used in its purity. Now, while it is not an effective architecture or such as is suited to commercial uses, yet there can be no question but that it is well handled and is really better for street architecture than the heavy, classic styles, which they were prone to use a few years ago.

SIZE OF SCOTCH BRICK.

The brick here are of a different size from anything that we are used to. They are 3½ inches high, 4½ inches wide, and 9 inches long. Altogether quite a different proportion from the American brick. Then there are bricks of special width which are manufactured for specific purposes, say thin partition walls and the like. They form partitions in stairways and other unusual places of that character. I have seen bricks which were 6 inches wide and others which were 8 inches, and again those which were 5 inches. Their thickness appears to be uniform. I am not suggesting a change in form of brick by American brickmakers to conform to what is in use here. I merely mention these facts in order that clay-workers and those interested may become familiar with the practice in other sections of the world than that in which they live and do business.

Nearly all the stairways here, even in the unpretentious and moderate cost structures, are of stone. It is rare, indeed, that one sees a stairway with wooden steps. Stone is almost universal. In the cheaper structures the stairways are formed by a brick wall on each side, a partition in the middle of the hall, and the steps built in between. This makes a well nigh fire proof arrangement. Particularly is this true where the landings and halls are floored with concrete. This sort of work is done particularly well here and makes a structure of permanent character. In this kind of building work there is the element of substantial building and freedom from great loss by fire with which we are unfamiliar in our less expensive building work in America. It is so true that we are disposed to do so much for display and in emulation of luxury by a showy veneer on buildings wholly of wood that we neglect that which is substantial and lasting for the other which is temporary and shakely. A great many of our American people imagine that the substantial building work, which is so common abroad, is too expensive to be considered in America. All that America has to do to get substantial building for

the same money that is being expended now is to drop "jim cracks" and showy displays and pay the same attention to getting something substantial which they have paid to creating a vulgar display. This latter thing has been so common in America that many of us have failed to recognize just what we are doing and we go along the same line without an adequate knowledge of our real course.

GOOD MORTAR NECESSARY.

I notice what has been mentioned in these columns before—that the character of the mortar which is used in brick laying is very superior. I see chimney caps, wall copings and string courses made of brick which appear to have stood the test of many years. Now, it is true that anything that pertains to good brick laying is to the interest of the clay worker. Anything which will bring credit to brick in any way is to the interest of the brickmaker.

I said that a large use of terra cotta was not made here. I refer particularly to its use in general building work. It is most common in chimney extensions or for chimney pots, as they are called here. They are set on top of the brick work and do not act as a coping for the chimney except in rare instances. A chimney pot of terra cotta appears to be regarded as a prime necessity for all well regulated chimneys.

Light, yellow fire brick is used very largely in this section for trimming buildings of moderate cost. They are altogether quite common in factories, mills, moderate cost stores, cheap dwellings and structures of that character. Now, with us, as far as I know, fire brick has not been largely used in that way. I can remember that in our own city most of the light brick which have been used for trimmings have been brought from Milwaukee, but as fire clay is quite common there is no reason why it should not be used for making a light colored or buff brick in any section where it is readily obtainable. The mottled brown which one sometimes gets in fire brick would be quite as interesting in an entire structure as the Roman brick which is being so extensively used in some of our large cities.

A CITY THAT BUILDS FOR ITSELF.

Many of the readers of the CLAY WORKER, no doubt, know that the municipal organization of Glasgow is supposed to be the finest in the world. The city does a great deal of building. It owns model dwellings or flats, its engine houses are built with flats above them

for the members of the fire department to live in. They have constructed large, public baths, laundries, gas works, water works buildings, city stables, public halls, and many structures which may be used for the comfort and convenience of the people. Most such buildings are of brick. Many of them are trimmed with the light brick referred to above. They are of a most substantial character. In one of the model dwelling houses which I visited, the floors of the halls and stair landings were formed with terra cotta blocks which were not more than three inches in thickness and which were arched into light iron beams not over four inches in height. There was the plaster below, and the smooth, hard, easily cleaned cement floor above. The side walls to the height of about six feet were lined with white, enameled brick, and above this came a very superior plastering directly on the common, brick wall. Now these model dwellings consisted of one and three room apartments. They were houses which rented for \$40 to \$60 a year an apartment. Notwithstanding the very substantial character of this structure and the high quality of the interior appointments this building paid a fair return to the municipal organization. There could be absolutely no chance of injury or defacement to the halls and very little to other parts of the building. The cement floor and steps were clean and white and the side walls of the enameled brick were purity in itself.

A RICH FIELD FOR AMERICAN BRICKMAKERS.

I wish to say that in the manufacture of enameled brick, which can be sold at a moderate cost, there is an immense business ahead of the American brickmaker. I am aware that enameled brick in limited quantities and at a high price have been made and sold in America. In this city I see them on every hand. Buildings which have the commonest of uses are made pure and beautiful in appearance by the use of these enameled brick for wainscoting. Americans are sufficiently progressive to use an article of this kind at a moderate cost and there is no reason why they could not be made, and made cheaply. They will not come into general use at a high price, but at a moderate price will come to be regarded as a prime necessity in all fairly decent structures. In some of the more expensive structures I see the enameled brick used entirely, particularly in courts or dark places where re-

flected light is all that may be had. Oftentime the water closet partitions in the railway stations are made of these beautiful white brick. Brown brick is also in common use, that is, a brown glazed brick. This is one of the things before our American brickmakers which can be made to pay if the brick is sold cheap enough, and they certainly can be made at a low cost. A brick with about the same glaze that is put on our brown or gray stone jugs and crocks would certainly be popular, and there can be no question as to the possibility of doing this work at a low cost. The lighter gray crock color would be sought by all the architects as soon as they were obtainable. It would be used in wainscotings of private houses, to line kitchen walls, for bath rooms, in vestibules, for mantels, for decorations on the front and oftentimes for the construction of large stores and entire fronts of great height. If a thing of this kind were started it would move and become vastly popular. I have not seen any of these gray tiles here but the white and light brown are altogether quite common. It was only today that I noticed a number of stores which were shaded by an elevated railway which were made entirely of the white brick, and the interior of their show windows were lined the same way. The effect was dazzlingly beautiful. A little gas light in front of one of them made it sparkle and dazzle like an incandescent lamp. In the lodging house which I mentioned all the water closets were lined with these white enameled brick, which by the way, are put in as the building is erected. Neither weather nor hard usage appear to effect them. The general use of these white brick has made more impression on me than anything which I have seen which may be of value to the American brickmaker. It would be well for some of our friends to first experiment with the glaze which is used upon the jugs and crocks. Any colored glaze, in the bright climate of America, would look well for uses mentioned.

White tiling is in very general use here, I saw it used very effectively in a public bath for lining one of the large pools. This pool was 78 feet long, 48 feet wide and varied from 3 feet to 6½ feet in depth. The sides and floor were lined with this white enameled tiling with only a few lines of black tiling running around it. The effect in the clear water was beautiful indeed. I saw in one of the engine houses a bath tub made by

the firemen themselves, which was lined entirely with white tile. This applies not only to the inside part which contains the water but to the top and outside. When used in connection with a room which was lined with the white enameled brick referred to the effect was beautiful indeed.

I may say in connection with clay work that everything in the way of bowls or sinks are of white earthenware and that anything in the way of copper or cast iron for that purpose is not readily seen. Here is another pointer for the clayworker. LOUIS H. GIBSON.

Glasgow, Dec. 8, 1890.

AN UNMISTAKABLE EVIDENCE OF CONFIDENCE.

AUGUSTA, GA., Jan. 30th, 1891.

T. A. Randall & Co.,

DEAR SIRS—Enclosed please find N. Y. check to pay subscription to December, 1892, amounting to \$4.60.

Your publication is well worth the small advance you have made in its cost to subscribers.

Unfortunately I have mislaid some of the numbers, one particularly wanted at this time of the year, it having contained the official report of an expert engineer as to the relative and comparative cost of brick, asphalt, Belgian block and Macadam for street paving. Will you do me the kindness to forward me the report and other information bearing on the subject? I want all the data possible as to first cost and maintenance, as well as, showing the superiority of brick over other paving material, because of its safety to horses, freedom from noise, cleanliness, and, in case the pavements have to be disturbed to lay pipe, etc., the ease and perfection with which it can be repaired. Our city is agitating the subject of paving the streets and none in authority have ever seemed to have heard or thought of brick.

Augusta, Ga.

W. E. McCoy.

VALUED HIGHLY.

TALLAHASSEE, FLA., Jan. 20, 1891.

T. A. Randall & Co.:

Enclosed find our check in full for CLAY-WORKER until December, 1891.

We note your increased figures but really think it well worth the price, for among all our brick literature, (except, perhaps, an order for brick) we esteem the CLAY-WORKER the most interesting and valuable. With best wishes for 1891,

TALLAHASSEE PRESSED BRICK CO.

CORRESPONDENCE.

THESE COLUMNS ARE OPEN TO ALL. THE FULL NAME AND ADDRESS IS REQUIRED BUT WILL NOT BE PUBLISHED EXCEPT WHEN PERMISSION IS GIVEN BY CORRESPONDENT. THOSE DESIRING TO COMMUNICATE PRIVATELY WITH ANY CORRESPONDENT WHOSE FULL NAME IS NOT GIVEN CAN DO SO BY ADDRESSING LETTERS CARE OF CLAY-WORKER.

Vitrified Bricks.

Editor Clay-Worker:

I went to the Convention with some samples of vitrified bricks, made by the New York Brick and Paving Co., at Syracuse, N. Y., and expected to say something on the subject of vitrified bricks, and was all "plumed" for the occasion, understanding that there was to be a night session Thursday night, when "Vitrified Bricks" would be fully discussed, but much to the discomfiture of myself and others, there was no night session, and I lost my opportunity; but not to be outdone I now appeal to the CLAY-WORKER, and ask you to lay before our craft the thoughts I have garnered regarding "Vitrified Bricks."

What is a vitrified brick? Webster says, "to vitrify is to convert into glass by fusion, or the action of heat, as to vitrify sand and alkaline salts."

Vitrifiable: "Capable of being vitrified, or converted into glass by heat and fusion, as flint and alkalies are vitrifiable."

"Fixed alkalies, soda and potash, volatile alkali, ammonia."

Hence a clay to be vitrified must contain sufficient vitrifiable properties to bring about a thorough fusion of its different component parts, converting the whole into one homogeneous mass. A vitrified brick being converted into glass, should, like glass, be impervious to water or acids, and a brick that will absorb water in the slightest degree is not vitrified.

The objection will naturally be raised that a glassy brick is too brittle, and will not stand concussion incident to heavy traffic, but if the bricks are well annealed after being vitrified, instead of being brittle they will be very tough, and will stand concussion far better than bricks that are not vitrified.

We hear every day the term vitrified applied to hard burned bricks, this is a misapplication, as there is a vast difference between a hard burned and a vitrified brick. There are quantities of clays that cannot be vitrified, for the simple reason that they have not the chemical properties necessary to produce vitrification.

We hear the term vitrified applied to pavers made of fire clay; this is absurd;

fire clay is non-fusible, and fusion is the essential element in vitrification, and while good pavers may be made of fire clays, and other clays that will burn hard but will not vitrify. The best paver, and the best brick to withstand hard wear, and rough usage, is the vitrified brick.

If a hard burned brick will last twenty years in a roadway, a vitrified brick will last fifty years in the same roadway.

It therefore behooves the paving brick manufacturer, to study his clay and endeavor to make a vitrified brick.

The following is a letter from the Chemist of the Solvay Process Co., as to a test given the vitrified bricks made by the New York Brick and Paving Co.:

"GENTLEMEN:—The vitrified bricks we purchased of you are impervious to caustic soda solutions. A brick vitrified, placed in a 20° Be' caustic soda solution for several weeks was perfectly sound, there being only a very thin scum on the outside. An ordinary brick in the same place would have gone to pieces.

"Where we have found them especially useful is in the top layer around the caustic pot. Here the bricks are continually heated, and now and then exposed to hot liquid caustic soda, which is destruction to the ordinary bricks, as the caustic gets into the very center, and, then the brick goes to pieces.

"It is not so with the vitrified bricks. Seldom more than one or two ordinary bricks once used in this place are fit to be put back again.

"But of the vitrified bricks every one was set a second time and are still sound.

"The following is the test of the bricks, ordinary and vitrified, one-quarter inch from the surface to determine the percentage of caustic soda.

"Both had practically the same treatment.

Ordinary brick.....19.53 per cent.
Vitrified " 1.64 per cent.

Yours truly,
(Signed) J. D. PENNOCK,
Chemist.

From the foregoing it will be seen that vitrified bricks are proof against caustic soda one of the most destructive agents known to chemistry. It is very essential that paving bricks should be impervious to acids, and other chemicals, as well as moisture, for the reason that the refuse of the streets of the cities contain a certain percentage of these disintegrating elements, that are now more energetic in producing decay in pavements, than either moisture or wear. Hence the pavement that is invulnerable to the encroachments of these insidious elements, is bound to outlast all others, and is preferable from either an economic, mechanical or hygienic standpoint.

The field for vitrified bricks is not confined to street pavements, they are the very best material that can be used for foundations, sewers, culverts, abutments, and piers for bridges, etc., etc.

In fact, the field is unlimited, so let us agitate this question and not only open the eyes of our craft to the merits of vitrified bricks, but call the attention of engineers, architects and builders to the advantages to be derived by their use in all important structures.

I do not say that vitrified bricks are the only paving bricks, but they are the best, beyond doubt, and I hope the day is not far distant when all of our cities will awaken to the fact, that for beauty, noiselessness, cleanliness, healthfulness, and lasting qualities, vitrified bricks are "nonpareil." ED. H. CALLAWAY.

Utilizing Waste Heat.

Editor Clay-Worker:

We answered a "subscriber" of your valuable journal a short time since in regard to the utilizing of waste heat from cooling kiln in watersmoking and starting green kilns, which article has brought to us several letters of inquiry for further information and you asked us to favor you with a few lines further upon the subject. In response will say we feel a little delicacy in saying as much as we would like to say for fear it might be construed as an advertisement. However, we trust that should we benefited, the craft of clayworkers may derive as much benefit.

We use in our works a nest of four of Newman S. Clark's Patent Up and Down Draft Brick and Pottery Kilns. The four have one smoke-stack situated in center of the group and are all connected therewith by underground flues or tunnels, and these tunnels are so connected together that the exhaust heat of one kiln may, by the use of dampers, be drawn from one kiln to any of the other four and the heat that would otherwise be wasted is used to excellent advantage in watersmoking and starting the next kiln. This not only saves fuel but conveys a better heat than that produced by fresh fire from direct draft for this purpose and from the peculiar construction of our kilns is more evenly distributed to all parts of the green kiln. We might enter into a detailed description of our kilns and connections which would be necessary to convey anything like an intelligent understanding of the advantages we claim over any other kiln in use, but this would make our article too long and

would be taking an unwarranted advantage of your kind indulgence. We will say, however, that by our process we burn every brick in our kiln evenly and uniform in strength and color and have not a single bat in a kiln of 75,000 brick.

One of our main features of economy is the fact that there is no waste material in the way of bats. Another important feature with us is the economical use of fuel. We burn with half the fuel that is required by some of the popular kilns now in use. Our kilns are what we call self-feeding, thereby keeping up a uniformity of heat not found in other kilns. Our experience in brickmaking is that the question of fuel is the important item, especially where works are situated as far from the coal mine as ours are. The second item we find is the keeping up of uniformity of the heat and being able to regulate it at will, and the third and growing item is to have such machinery and appliances that both fuel and labor can be used to the best advantage.

In conclusion, allow us to add that with the proper kilns, and the right kind of machinery and being possessed of suitable clay, there is but one thing for the experienced, practical clay-worker to do in order to produce a good quality of brick or pottery, and that is to keep himself posted, and in order to do this he should regularly read the *CLAY-WORKER*.

J. S. GIBSON

A New Jersey Plant.

Editor Clay-Worker:

In looking back over the past few years I am astonished at the wonderful progress made in the art of brickmaking and amount of capital invested in different parts of the country which I have visited. In fact, every branch of clay-working is receiving more special attention every year and is making rapid strides toward higher attainments both in improved quality of goods and improved machinery for their manufacture. We find ourselves wondering sometimes what can or will be made from clay in the future for the use of man.

I came to this place last July and built a Eudaly Kiln for C. Pardee Terra Cotta Works, which plant was then being built and a brief description of the plant will form the basis of this writing. The works are located on an old estate about one mile from Perth Amboy known as Eagles' Wood, fronting about half a mile on Raritan River. The property containing about one hundred and seventy-five acres, was purchased by Mr. Calvin Pardee, of Philadelphia, under foreclosure, and as the greatest part of the land is underlaid with a fine vein of clay, it was decided to erect a plant for the manufacture of terra-cotta. The services of Mr. John N. White, a former employe of Mr. Pardee, was secured as general manager and Mr. R. W. Taylor was employed as superintendent. The work of excavating and foundations were begun early in the spring of last year.

Mr. Taylor being a practical man in terra cotta work got up the plans and specifications for buildings which were begun later on. The main building which is built of brick is two hundred and fifty feet long and seventy-five wide, half of which is two stories. There is also a large boiler and engine house adjoining also built of brick. The original idea was to manufacture terra cotta, but being in close proximity to all other works of the same kind, and therefore competition would be greater in that class of work, it was decided to turn their attention to the manufacture of front brick of different colors which find a ready market in the city of New York. The colors most in demand are buff, brown and speckled. In making the speckled brick a clay is used which has a large per cent. of iron in it and when put into kiln they are set so the flash from the fire marks the face and the iron comes out in spots, these brick in a wall make a very pleasing appearance.

The original plan for the buildings were somewhat modified so as to conform to the manufacture of fine brick. After making various tests on different machines, an outfit was purchased of the Frey-Sheckler Co. of Bucyrus, Ohio, including the Centennial Brick Machine, pug mill, double roll crusher, also one of their latest improved dry pans which is a model of durability and simplicity. They have also two Raymond Re-presses, one power and the other hand press. The Frey-Sheckler Side-cutting Table which delivers the brick on pallets, works admirably. In addition to the plastic process, they intend to make a dry pressed brick and have purchased a machine of Chisholm, Boyd & White, of Chicago, which will be ready to run in a few days. Having previously tested their clay it was found especially adapted to the semi-dry process and burns a very rich buff color. The battery of boilers was furnished by the Phoenix Iron Co. of Meadville, Pa., and the engine a Hamilton-Corliss of one hundred horsepower, was furnished by Messrs. Hoover, Owens & Rentschler of Hamilton, Ohio.

The present arrangement for drying is in the ordinary way, having a system of steam pipes running under a slatted floor which is supplied with live steam from the boilers. In addition to this dry floor they have in course of construction a tunnel dryer which is a patent of Mr. S. G. Phillips of Woodbridge, N. J., and who is at present superintending the work. Having never seen a dryer of this kind in operation I shall not attempt to describe it—only a few points as I understand it. If it will do the work claimed for it there is no doubt of its being a grand success both in economy of fuel and time. The dryer proper is a large tunnel with a row of exhaust fans through the center placed about fifteen feet apart lengthwise, and located between the fans on the same line are the steam radiators, which are zigzag coils of pipe standing about six feet high. The tracks for cars are on each

side of this row of fans, there being two lines of cars in the one tunnel. The air is admitted at one end of the tunnel or at sides, and the fans are so placed that when in motion there is a spiral column of air formed which travels through, being heated by radiators and is discharged at the other end. The dryer is said to be working very successfully at two different places and they can dry soft mud brick in three hours for re-press and finish drying ready for kiln in ten to twelve hours. It is claimed by Mr. Phillips that this process comes nearer the natural air dried brick than any in use.

We have one round Eudaly Kiln burned and will begin setting square kiln in a day or two. These are the first of the Eudaly Kilns in this section and quite an interest is manifested in their working by other brickmakers in the vicinity. Mr. Pardee intends placing machinery soon for the manufacture of floor and roofing tiles and is already erecting a short distance from the brick plant, buildings and kilns for the manufacture of enameled goods. Persian enameled glass is the principal feature of the business. I was shown some samples of the work done by the man whose services are secured for that department, and they are magnificently executed both in colors and design.

This whole plant when complete will be first-class in every respect, as nothing in the way of modern improvements has been overlooked and the extra cost of having first-class work done in every particular has been an after consideration. The best of material that could be purchased went into the construction and Mr. Pardee enjoys the respect and confidence of the people of Perth Amboy for the enterprising spirit displayed by him in erecting such a large plant that gives employment to a large number of their citizens. More anon.

W. M. BURTON.

Enameled Brick.

Editor Clay-Worker:

In the number of *CLAY-WORKER* for September which has been sent to me, I notice a paragraph on the subject of "Enameled Brickmaking."

I am not surprised to learn that this branch of brickmaking has made so little progress in your country, only one place being able to make them successfully. I must confess that I find several big things set forth in your book as being done in the new world, but the biggest thing to my thinking is, that this one firm are making enameled brick in all respects identical to those imported from England. Allow me to say there are brick, and brick made in England, and to make brick in the new world in all respects identical to some of them would not be a very great achievement; but if the best brick of this class are sent to America, then I say it is a big thing if brick in all respects identical to these are made there.

I believe you will say the same, when

I tell you that there is only one part of this country where these goods are made of a really high class quality, and in no other part of the United Kingdom have they ever been able to compete with them. The fact is, that the history of glaze brick making in this country is a history of loss and failure. Within the last thirty years hundreds of manufacturers have tried it and scores of thousands of pounds have been sunk in it, and not more than two out of every hundred have succeeded in making brick of commercial value. Therefore, you will perhaps see the reason in my reasons for being just a little skeptical with regard to the point named by your correspondent.

The best enameled brick in the United Kingdom are made at Leeds, or Yorkshire. The quantity made there per week by all the makers is about 300,000—for quality in all respects and quantity in a given time they have never been equalled. The fact that the enamel is thoroughly united with the brick, is not the only fact that makes these brick very superior to all others, as no enameled brick would be looked at in this country that was otherwise, and all enameled brick are quite worthless that are not impregnable to all climatic changes, no matter how severe they may be. I have no ulterior object in view in writing this paper to you. My wish is to stimulate inquiry, as I quite think that this branch of brickmaking should have a great future before it in your country, and, if this letter should be thought by you to be worth publishing, I will write another on the characteristics of a good brick and the causes of failure to produce them.

MANAGER.

Monmouthshire, England.

Starting Right.

Editor Clay-Worker:

During my wanderings I stopped a few days at Louisville, Ky., and while there I made the acquaintance of the McDonald Brick Co., and paid a visit to their new works at Lochland, Ky., about five miles from Louisville. Here they have literally a mountain of shale, which they are working direct from the bank, and also a fine yellow clay. Their yard is a model one in every respect, the arrangement being perfect, and the machinery and fittings the most modern and improved. They have a 75 h. p. Buckeye engine, a 4-mold Boyd Brick Press, a Frost Dry Pan, and a screen and mixer made by M. F. Williams & Co., of St. Louis. The capacity of the yard is 20 M brick per day, and their product is the very finest and not to be excelled in the State, if anywhere.

The president of the company is Mr. S. P. Meyer, formerly a large railroad contractor; vice-president, H. P. McDonald, of McDonald Bros., prominent architects of Louisville; treasurer, Donald McDonald, also of McDonald Bros., architects; and secretary, A. L. McDonald. Mr. August Straus, superintendent of the Courier-Journal Job Printing Co., of

Louisville, is one of the directors. This company find a ready market for all their product, and their prospects are very flattering indeed.

RAMBLER.

Been There Before.

Editor Clay-Worker:

We are home again from Indiana and Indianapolis, where we were in attendance at the annual gathering of the N. B. M. A. *We are glad we went.* We reasoned the matter in this way: That it would be better to go and be sorry that we went, than to stay at home and be sorry we did not attend.

While in attendance at the gathering of the craft, I could not help but contrast the difference in the reception and entertainment of the clayworkers of today, and that given a certain set of clay diggers a few years ago.

We noticed among the members of the convention quite a number who wore a small bronze button or badge in the buttonhole of their coat or vest. It may not be amiss to explain here that it is not a brickmaker's badge, yet it means that the wearer got his first lesson in the art as a clay digger.

Twenty-five years ago last November, the writer, along with quite a large delegation of citizens, staid over night in Indianapolis for the first time. Now mark the contrast. We came into your city late at night, cold, hungry, tired, and were refused admission at the hotels and boarding houses. And I must say, were somewhat indignant at our treatment. But looking at the matter now, after a lapse of time, I believe that the landlords done about the right thing when they refused us. Some months previous to our first visit to Indianapolis we had hired our services to our respected Uncle Samuel, and he had sent us South in charge of a learned professor to prospect for and locate certain "Brass Mines," which we had done to his entire satisfaction, and had located a brass mine at various places, notably those at Fort Donaldson, Pittsburgh Landing, Corinth, Vicksburgh, Knoxville, Chattanooga and on south for two hundred and fifty miles, we came very frequently upon great quantities of brass, bronze, iron and steel, in unexpected and out of the way places, great masses of brass weighing several hundred pounds each. In our search for bronze we had a great deal of digging to do, in the course of which we discovered also, coal, iron ore, and great beds of clay. I am told that some of our men dug through clay beds of great depth at Andersonville, Ga., and at other points, some say, one hundred feet in depth. I know there is plenty of clay down that way, pipe clay, brick clay, fire clay, fine white kaolin, and other kinds. And some of us were led to believe that the future demand would be such that would warrant us in making bricks to sell. I did hear also that some of our prospecting party had found a "brick mine." I always listen to such stories and don't say much. The story started among some of the men who

staid around in the neighborhood of Atlanta after Professor Sherman left there. My recollection is that there were only a few brick houses in Atlanta twenty-five or thirty years ago, and if there had been a "brick mine" there, as stated, there would have been some good brick houses instead of a lot of dilapidated structures. I was over in Columbia, S. C., a few months ago, and some of the people there pointed to a lot of old bricks and bats that were being dug up on the main street as a "brick mine." I told them then and there, that I would rather own a good hand yard or a small horse-power machine yard than to be the owner of such a "brick mine." It looked to me as if there had been a fire, and I said so. I told them we had a bigger "brick mine" than that up on Lake Michigan a few years ago, that the people there just made bricks and covered the "mine" all up with new brick buildings—stores, churches, hotels, and other great structures.

When we came to Indianapolis that night we must admit that we looked a little rusty. Most of the party had left their dress coats at home, and our every day suit had got soiled and on account of our tattered and battered condition, we were counted out by the landlords. We made part of our journey home on board the steamboat, coming up the Mississippi River, and some of the party had undertaken to wash their shirts and do them up themselves, and, as is usual, had made a mess of the business. They got a long rope and tied their clothes to one end and fastened the other end to the boat, and then threw the soiled linen over in the river and expected the clothes to be all washed and rinsed, and ready to be dried out, starched and ironed next morning. But during the night some one wanted a piece of rope, and cut it off the wrong end of the line, and in the morning the shirts, socks, collars, etc., were gone; the rope had a forlorn look and the wardrobe was more scant than formerly. That discouraged most of the party and prevented our getting ourselves tidied up; and was probably why the landlords didn't want us to sleep in their beds. Uncle laughed at us being fretted over such trifles as sleeping out doors, as we were obliged to do, and he escorted us down a side street not far from the Union Depot, and selecting a piece of dry looking sidewalk, gave us permission to go to bed. The street had a fine southern exposure. Uncle knew we had a liking for Southern views and outlooks, and there on the south side of a picket fence, we wrapped our Government blankets about us, and went to bed on the soft and dry side of a brick sidewalk. Thankful we were that the Indianapolis people had not laid their sidewalk with the hard, cold, damp side of the bricks uppermost.

When we roused ourselves the next morning the sun very kindly lent his rays to warm us, and revive us. We had a peculiar way of our own, of evolving something to eat and drink, and so with a little skirmishing around we soon got

our breakfast, and forgot our insults and indignities of the night before. A few hours later we loaded ourselves aboard a train of box cars and shipped as live stock. We went to Columbus, Ohio, and made a visit.

We are proud of the Indianapolis brethren, they have certainly improved in their methods of entertainment, judging from former experience. However, we acknowledge that there could not be a gathering of any more importance than that of the brickmakers, and on such occasions there must necessarily be an overflow of good feeling and a dispensing of hospitality that is pleasant to think about. We want to go and see you again!

J. A. REEP.

Knoxville, Tenn.

Use of Escaping Heat.

Editor Clay-Worker:

"A Subscriber," who on page 426 of December CLAY-WORKER, "would like to know if two down-draft kilns can be so arranged, using one smokestack, that the escaping heat from cooling kiln can be safely and cheaply used to dry the other," will find the question clearly and practically treated on page 90 of Mr. Cray's book, "Brickmaking and Burning."

Allow me to add that I consider this book the most valuable that I have seen on the subject, and one which I think no member of "the craft" who wishes to "PUT MONEY IN THY PURSE,"

can afford to be without. To the expert it is valuable, to the beginner invaluable. It is valuable because it is practical; because the reader feels that in being guided by its advice he won't be trying any experiments. I would gladly have given \$100 for the first two chapters of the supplement when I commenced trying to make brick, and I would have saved considerably by so doing.

ROBERT M. GREER.

Tuxpam, Mexico.

New York News.

Editor Clay-Worker:

Building and the kindred trades are dull, and the brickmakers are feeling the depression. The Hudson was blocked up with ice about Christmas, preventing any shipments to this city until about two weeks ago, when the mild weather resulted in the opening up of navigation. Since then there has been pretty nearly a million of brick afloat a day, but the demand has not been quite equal to this supply, and prices continue at from \$6.25 to \$6.50 for Haverstraws. Although the weather is mild and warm quite as often as it is cold and stormy, there is really but little building being done, the scarcity of operations not being due so much to the weather as to the fear of the builders that any houses going up now will be left on their hands. The prospects for the spring trade are also of a most discouraging nature.

As though the building going on in this city was not little enough at the present time there is every prospect of

its being still further curtailed within a few short weeks by a fight among the bricklayers. At the annual convention of the International Bricklayers' and Masons' Union of North America, which was recently held in Toronto, Canada, Bricklayers' Union No. 7 was suspended for non-payment of a strike assessment. The latter union has 2,000 membership, while there are nearly 3,000 other organized bricklayers in this city. To follow out the orders of the International Union the members of No. 7 must not be recognized as union men, and on all buildings where they are at work, the other bricklayers must stop. A big mass meeting is to be held next week by No. 7, and if the fight is made it will prostrate three-fourths of the building operations now going on here.

A committee of the Brick Manufacturers' Association of the North River District met at Rondout on January 10, and perfected a permanent organization. Among those present was a committee of the New York and New Jersey Brickmakers' Association and the following manufacturers: Washburn Brothers, Robert Lent, and William Maginnis & Son of Glasco, Jacob Kline of Port Ewen, Sutton & Sudderly, and C. S. Sudderly, Jr., of Coeymans, Cooney & Farrel of Malden, George Kerr, Robert Mains & Co., William Hutton, S. D. Coykendall, C. A. Schultz, Franklin Frederick, D. S. Manchester, A. S. Staples, Streeter & Hendricks, D. C. Overbaugh, Terry Brothers, Frank Vandusen, and Alonzo Rose & Co., of New York.

There were reports during the past week that the 500 brickmakers of the Lorillard Brick Works in Keyport, N. J., which assigned last November, and to whom some \$30,000 in wages are due, were starving. Charles Siedler, the receiver of the company, denied the report, although he states that but one payment has been made them since the failure, the complicated entanglements surrounding the business preventing his making a correct exhibit of the assets and liabilities, and therefore, preventing his procuring loans for the purpose of discharging the wages due.

A judgment for \$26,291 has been entered against Peck, Martin & Co., in favor of the Rose Brick Co.

Joshua Scott & Son, brick manufacturers, Salem, N. J., have made an assignment to Benjamin F. Wood. The liabilities foot up \$16,400; assets not given. Both members of the firm also make individual assignments. Joshua Scott's liabilities are \$21,738, against estimated assets of \$37,000, and David H. Scott's liabilities are \$4,356, against estimated assets of \$6,400.

Executions have been issued against Martin Disken, builder, of this city. His unsecured liabilities are reported to be about \$40,000, and it is said that all of his property has been transferred.

Antonio Gallo, a builder of this city, has failed.

Among the new buildings to go up in this city shortly, are, a 5-story iron front

Russian bath establishment to cost \$85,000, a 7-story hotel of buff brick and stone, 100x100 feet, to cost \$200,000, a big 14-story hotel, a 6-story hotel, of brick and stone, to cost \$45,000, a 7-story office building of brick, stone and terra cotta, to cost \$250,000, an 8 and 10-story stone and brick building, to cost \$250,000, and a 10-story brick and stone office building to cost \$300,000.

BRIC-A-BRAC.

All are Interested in Gas.

Editor Clay-Worker:

Will you kindly inform your readers that the last lot of blue prints I had made, have all been sent out, and no more will be made from those tracings, except by special request. I am having new drawings made, giving more detail, etc., and in place of one regenerative kiln, I show a complete set of four double kilns with producer, regenerative chambers, reversing valves, etc., complete. The pamphlet will also be supplemented with several pages of references, and explanatory matter, relating to the new prints which I may say are vastly superior to the old set in every way.

My patrons who have purchased the old sets, will be supplied with a new set and pamphlet free from the first batch I receive and in the meantime I must ask the indulgence of my new patrons for a few days.

It is astonishing what a strong hold gaseous fuel has on the minds of manufacturers of every description, and it is very gratifying to find that the CLAY-WORKER is read by many who are not connected in any way with clayworking as far as indicated by correspondence. I am glad also to find it is read by some of my English and Scotch friends in the "old country." WM. WAPLINGTON.

Philadelphia, Pa.

A New "Compo." Did It.

Editor Clay-Worker:

Somebody must be held responsible for several errors that crept into my article, No. 3, entitled, "Burning Oil For Manufacturing Purposes," in your January issue. I don't know how the copy reads, but my pencil notes, from which the copy was made, titles the article, "Air Necessary For Complete Combustion," and in the 12th line from the bottom of first column, my notes read, "are all resolvable into, the fuels, hydrogen and carbon." Then again, in the 11th line from top of first column on page 29, "Thermal nuts" is a term I caution "Will" "not to stagger at," and I promise "to explain it by and by," but I must take that promise back, and confess my utter inability to do it; if the substitution had been "peanuts" I would have let it pass. In the 14th line from bottom of same column the typos have it "the properties stated above;" if any of your readers look at it again, ask them to read, "the proportions stated above." In the 30th line from top of middle col-

umn, page 29, read 60° instead of 50°, then "the increase of 20°," as stated, will be correct. The next five lines are to be rattled off at one breath, and the meaning to be guessed at, for the lack of about half a dozen commas being inserted at different points. In the 4th line from bottom of same column read, "Prof. Thomson" for Thomas. In 16th line from top of third column on page 29th read, "one pound of oxygen," instead of "one pound of air," and in the second line below this, "two and sixty-six hundredths" instead of "two and sixty hundredths." Finally, in line 12, of first column, page 30, substitute *data* for "date."

Now, if you will either publish this letter, or call attention to these errors in your own way, I shall feel reconciled.

HYDRO-CARBON.

Philadelphia Project.

Editor Clay-Worker:

"Builders are coming to the front in our city and that with rapid strides."

The term is used in its broadest sense and includes every one who furnishes either labor or material for the erection of buildings.

Two movements of great moment are being pushed by these men, one the subject of rapid transit, the other, the establishment of a "Bourse" or a place for the transaction of general business. The idea was suggested to Mr. George Bartol on returning from a visit to the continent of Europe. The latter impressed him to such a degree that he called together representatives of nearly all the commercial exchanges in the Board of Trade rooms, where the matter was thoroughly discussed and a committee appointed to investigate.

Now for the project which will be one of the most stupendous affairs of the kind ever carried out. The proposition is to secure from the city a plot of ground known as "Washington square," located in the heart of the city at 7th and Walnut streets, and now used as a public park containing a number of acres. Here it is proposed to build a general exchange building, where business men will congregate, where buyer and seller can barter and the two great classes, the purchaser and purchasee, can transact as much business in one hour as they ordinarily could in an entire day.

The committee is hard at work on preliminary arrangements and has issued thousands of postal cards to the citizens asking for their individual opinions. The plan is growing in favor.

The idea of concentration is strongly urged by Mr. Bartol who describes the project as follows: "Every person who desires to be considered a man of business, either of Hamburg or any of the adjacent towns, must not only be a member of the exchange, but must be represented there daily.

Prior to the opening hour, the members may be seen arriving from all quarters and passing at once into the surrounding corridors, where the statistical information of the world is before them.

In a few moments all can acquaint themselves with those matters which are of interest to them in their own field of operation so that upon the striking of the gong all are ready to assemble on the large central floor for business. There are no calls of the different articles handled that I was able to learn of. All meet for actual business and trade directly with each other, with the result that the volume of business transacted is marvelous. It will readily be seen that an immense business can be done under the circumstances, when all parties necessary to a transaction are within touch of each other."

A QUAKER.

Mexican Kilns.

Editor Clay-Worker:

In reply to the numerous inquiries for a description of kiln referred to in Mr. Greer's letter in your columns, of a recent date, he has forwarded me the enclosed letter. I wish you would insert it in the CLAY-WORKER, for I believe it of interest to the clayworking fraternity, and as an answer to his correspondents in particular.

Yours respectfully,

THEO. DODD.

Millington, Ill., Jan. 8, 1891.

TUXPAM, MEXICO, Dec. 27, 1891.

Theo. Dodd, Esq.

DEAR SIR:—Yours of the 1st inst. to hand. The Mexican kilns referred to in my letter in November CLAY-WORKER are about as crude as anything can well be. A description of them was attempted by me in the April CLAY-WORKER.

A site being selected free from the chance of inundation, an excavation is made about three feet deep in which the kiln is built. The kilns are invariably very small and generally one of two patterns, viz.: about 6 by 10 or 12 feet or about 10 feet square, inside measurement, and rising about 6 or 7 feet above the ground. Permanent arches are built across the kiln upon which the ware is set. In the narrow kilns one set of arches is made the entire breadth of it, with a space of about 4 inches between each arch, and an opening is left at each end to fire from. In the square kilns two sets of arches are built and openings generally left at one end only.

I should have stated in my letter that it was roofing tile which was the ware burned. Mexico has not got far enough advanced for drain or sewer tile.

As a rule one course of brick 8x4x1½ is set first. Then one course of flooring tiles 10x10x1½ and then three courses of roofing tile in the shape of a half circle about 17x17x½, and set on their ends as close as possible together, which always leaves enough space for draft. The platting is two courses of roofing tile on the flat. The ware is just as dry as the sun can make it before being set in the kiln.

The watersmoke is driven off quickly and then the firing is forced as much as

possible with light dry wood. As a rule the kiln is lighted at, say, 6 a. m., and generally concluded at 9 or 10 p. m., same day. If it passes midnight it is considered a slow burn. If any object is hurrying the delivery of the ware, the doors are opened and platting removed next evening, and the day following the smallest sized kilns can be emptied and filled again ready to light that night or in the morning. This, however, rarely happens. The second burn is often accomplished in 14 hours or less. The ware is very often whitewashed but otherwise is generally hard and good.

As I have had several inquiries about these kilns, I intend shortly to send a description of them with cuts, or, perhaps, a photograph to the CLAY-WORKER, though anything less worthy of a place in the columns of that excellent paper could hardly be imagined.

With compliments of the season, I am

Yours very truly,

R. M. GREER.

Thinks Well of the Hoosiers.

Editor Clay-Worker:

Dear Sir and Friend: Allow me to take this early opportunity through your columns, to thank yourself and the generous clayworkers of Indianapolis, for the hospitable way in which the members of the National Brick Manufacturers' Association, including the ladies in attendance were entertained last week at your hands. I am certain that I voice the sentiment of both the ladies and members of the Association present, when I say, we spent a very delightful and enjoyable week in your city.

The week of the Convention, including the appointed addresses and discussions were fully up to the standard, and while the proceedings of the Convention were more frequently interrupted than has been the case heretofore, we believe that the printed report will show as great an amount of work done as that of any previous convention. Besides the advantages gained by these excursions, in a social way, are very great. Members become more intimately acquainted with each other, than is possible in the Convention hall.

Another feature of the last convention, which we think merits especial mention, was the unusual number of ladies present. We trust that at our next meeting we may have the pleasure of meeting a much greater number. Too much cannot be said in praise of the programme made especially for the entertainment of the ladies. I am certain that the hospitality of the Hoosier capital is not surpassed either North or South. I desire also to thank the many who gave valuable information to the Committee on Nomenclature and trust this public expression may be accepted in lieu of personal letters to each one.

As the committee was continued, we trust to receive still further data on the subject from the members of the craft. I confess I did not fully appreciate the importance of the subject until

after we began the investigation.

Trusting that our Association may continue to grow in strength and importance to the craft, which we have every reason to believe it will, and again thanking our Indianapolis friends for the courtesies received, I am

Yours truly,

W. A. EUDALY.

Cincinnati, Jan. 29th, '91.

A Convert.

Editor Clay-Worker:

Herewith find \$2.00 for the CLAY-WORKER. I am again safe at home. Yes, it was my first visit to a brickmakers' convention. What do I think of it? Well, I was very agreeably disappointed, for when I first thought of going to the Convention I expected to meet a lot of rough, uncouth, and unmannerly fellows, whose only talk would be, how many thousand brick they could make by hand in a sand mold or by the wet process in a slop mold, and whose only advancement in the art of brickmaking, from the Jews in Pharaoh's time, was that they were now able to make brick without straw.

But, instead of that, I found as fine a body of men as can be got together in this country belonging to one business—men who are able to hold their own in any kind of company, or in any kind of place, from leading the meeting in prayer to explaining the merits of the latest improvements in down-draft kilns, or the difference between the plunger and the auger machines for making paving brick.

Then when I went to the Pow-wow and found some of the brickmakers in full evening dress, even to the button-hole bouquet, and some who were full without the evening dress, at first I thought that I had got into the wrong pew. But when Brother Purington took the floor and told us about the "Brick-maker Politician," then I recognized an old acquaintance, for most every brickmaker I ever met is something of a politician, and I am glad of it; it shows that they keep posted and are up with the times. Then, that other man from Chicago, Gates, he certainly let down the flood gates of his eloquence, and, if it had not been that I was from a prohibition State, and had become weaned by law from all such influences as he described, I should have smacked my lips as he said, "When." Then, his description of the valley around Chatta-

nooga, the battle of Mission Ridge and Lookout Mountain was fine, and must have made the blood to flow quicker and the heart to beat more rapidly, of those who were in that fight, and had sought the bawble reputation at the cannon's mouth. Then there was the machine men and they are a good lot of fellows, so earnest and so honest and so sincere, when they are talking machinery to you. Why, when one of them has talked to you an hour or two, you go away from him convinced that he has the best machine on the market—until you meet the next one. Some appear to think that the machine and kiln men take up too much time, that they are too conspicuous, that it ought to be a brickmakers' convention. I do not think so; the one cannot live without the other; we are one and inseparable. If the kiln and machine men know more about the business, and can talk better than the brickmakers, let them do so, until we learn to talk better than they; and when we do, the convention will then listen to us. I think that the more we discuss machine brick making the better it is for both of us; the more and closer the relation between the men who make the machines and the men who use them, the sooner we will get a perfect brick machine; so I say give the brick machine men all the encouragement you can, for it is they who are making the success of brickmaking at the present time, and lifting the art out of the rut that it has traveled in for so many years.

I think that the Convention did a vast amount of good, and that it has only begun the good work; that the time is coming when we will take pride in instructing our sons in the mysteries of our art, which I believe will make more rapid advancement in the next few years than almost any other trade. As for myself, I was well pleased with my trip, and from this time on Kansas will take her place in the procession, and we will not be satisfied until we are marching where we belong—at the head—and as our attention is turned at present to vitrified paving brick, I should be pleased at all times to help any brother that requires any information in that line.

Yours truly,

THOMAS BEATTIE.

We Got It.

Editor Clay-Worker:

If some thief don't get this two dollar bill before you do, send me the CLAY-WORKER for '91. I am not much of a

brickmaker. May your shadow increase rather than grow less, is the wish of,

A. W. WALTON.

Princeton, Ill.

Time and Money Well Spent.

Editor Clay-Worker:

DEAR SIR—Herewith I enclose two dollars, being one year's subscription to the CLAY-WORKER, also three dollars for copy of the book, "Brickmakers' Manual," just published by you.

I need not tell you that I had a delightful time at the Convention and felt that it was time and money well spent, as the new ideas advanced and the interchange of experiences was very helpful to me in very many ways. The time seemed altogether too short for the very many things that ought, in a convention of this kind, be discussed. And yet, I have no doubt that it is impossible to crowd everything in at such a meeting, but, as the columns of your journal are open, I think that some time in the future we shall be able to have a supplementary (if I may term it so) discussion on many points of general interest to the National Brick Manufacturers' Association.

JOSEPH FAIRHALL.

Grape Creek, Ill., Jan. 27, 1891.

All Right in its Place.

Editor Clay-Worker:

Enclosed please find two dollars subscription for CLAY-WORKER for current year. Can't make brick without the CLAY-WORKER any more than the Israelites of old could make them without straw. There was about 30,000,000 brick laid up in the walls in Spokane Falls since the beginning of the year. All traces of the great fire of August 4th, '89, have been wiped out with five or six story blocks. The business of manufacturing brick was entirely overdone to the loss and sorrow of many an air castle building clayworker. On every spot with clay on it in the vicinity of the town and on a dozen different points on the railroads running in here, you will find some kind of a brickyard. One very tantalizing thing for a brickmaker, too, is to be reminded by friends and acquaintances of what a fine thing he has in a fire in the town or towns in his vicinity. My experience in life is, that fire, except under brick, in this world or the next, is a curse of the first magnitude to a brickmaker. With best wishes,

Yours truly,

J. T. DAVIE.

Spokane Falls, Wash., Jan. 12, 1891.

THE CLAY-WORKER.

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ADVERTISING RATES furnished upon application.

Correspondence on all subjects of interest to Clay Workers is solicited. Communications from practical men will always be welcome. Address all communications to

T. A. RANDALL & CO.,

81 Massachusetts Ave. Indianapolis.

THE REASON WHY.

When the Barber Asphalt Paving Co. decided to push things they employed Lieut. Greene at a salary of probably \$5,000 to \$10,000, and sent him to Europe for six months to "knock about and pick up all he could about pavements," and yet the brick men wonder how it is that five asphalt pavements are laid where one is laid of brick. The truth is found in the intelligent planning, the energy of execution, and the persistence by which the asphalt people sound the praises of their product. Brick has repeatedly demonstrated its superiority and cheapness, and yet compared with asphalt the public know little of it.

Success depends fully as much upon management and energy as upon the perfection of a product. We have known many inferior articles placed upon the market and sold right in competition with a superior one of the same kind, that was offered for less money, simply because the manufacturer in the first case dinned its praises in the public ear, while the other "hid his light under a bushel." Perhaps lack of capital among the brick men may have something to do with the apparent lukewarmness visible compared with the energy of the asphalt men, but this could be overcome, as the asphalt men overcame it—by concentration among several prominent paving brick manufacturers. The printing press has groaned with a mass of literature on asphalt pavements. The columns of an influential daily press

have sounded the praises of asphalt, until the public has imbibed a prejudice in its favor that will only wear away with the pavement itself, which, fortunately for the brick men, is a rapid process.

But while the asphalt pavements are rotting or disintegrating, the brick manufacturers are given their opportunity, and if they take counsel from the tactics of their antagonists, they will have a brick pavement, or several, in every principal city or town in the land. But it will require push, or the asphalt people will have another coat of tar over their previous failure, that the press will herald as "the latest, newest and best improvement of pavements in the century."

LET REASON PREVAIL.

It is reported that delegates of 12,000 brickmakers' recently held a meeting at Lippe Detmond, Germany, for the purpose of forming a union, and declared in favor of fourteen hours as one day's work and the abolition of labor on the Sabbath. The inference from this is fair that the hours of labor there have been more than 14 per day, and that labor on the Sabbath has been the rule. The incident brings into startling contrast the conditions of labor in the old and new worlds. When one learns such facts as these, one is at loss to understand the condition of chronic stewing, fretting and discontent exhibited by great numbers of our own favored workingmen. At most we work 60 hours per week, and get three times the price for it that the German gets for 90 hours. Perhaps some reasons exist for discontent, for discontent at something is common to all of us, but most of it is due to a perverted imagination, such as comes to all who will set their eyes on the shadows of life, and refuse to look at its lights. It is a sort of morbid, dyspeptic gloominess—as if our trades unions had passed this resolution: "Resolved, that we are miserable, if not, that we make ourselves miserable."

They certainly succeed, and also in making every one else miserable. Several seasons of ceaseless agitation has confused the trade so much that the imaginary misery is gradually getting real. Last season the capital of the employers was seriously impaired, and in many instances their trade passed into other hands, or other channels, and the workmen lost the source of his employment and destroyed the ability of his employer to pay even the wages that had satisfied his men so long. Labor is fond

of comparing capital with the fabled individual who killed the goose that laid the golden egg. But labor is doing this thing with all the energy of a blind Cyclops.

Market conditions are not so easily changed as the resolution of a union for more wages or less hours. Profits are close, competition severe, and sales hard to make. If the employers could raise their prices as easily as a union can "alter the scale," we have no doubt the employers would be in a position to double the wages. But the reverse is true. There are other materials than brick, and when brick goes too high, other materials are preferred, and sometimes the preference becomes permanent, and the old material has by so much been permanently destroyed.

The conditions for a profitable, busy season, are most auspicious, and nothing is apparent to change it except the hostile attitude of labor. It is to be hoped that reason and not imagination, actual conditions and not impossible ones will rule, and that both labor and capital will make a truce, say for a single season, just to learn how much better the harvest will be. Above all let the workman look outside and not inside for his comparisons. It is a long distance between actuality as seen at Lippe Detmond, and the paradise pictured in the mind of an American workman, albeit the latter will see, if he will look, that he at least has reached the half way point.

SIGNS OF PROGRESS.

This is an age of progress in all departments of business life, and, especially, in the mechanical and industrial branches, where one improvement after another is introduced and pushed energetically before those most interested, and, as a result, rapid strides forward are being made. In no field is this advance more marked than in the manufacture and adoption of clayworking machinery.

This progress is evidenced in many ways, and in none more notably than in the character of the trade literature, or catalogues, that are now being offered to the craft. Less than a decade ago, the most pretentious of trade publications in our line were nothing more than mere pamphlets or circulars, with perhaps, one or two poorly executed engravings of some particular machine or device, that to-day would scarcely be considered worthy of a passing glance. Things are not as they used to be. The requirements of the trade demand some-

thing more elaborate and in place of the pamphlet, we now have *trade catalogues* printed in the highest style of the art, on the finest of paper, and profusely illustrated with costly engravings; all in all representing an expenditure that a few years ago would have seemed unreasonable and extravagant in the extreme. Now they are regarded as a necessity, and, in part, indicate the ability of the manufacturer to keep up with the procession. We have recently received several specimens of trade catalogues which are worthy of more extended notice than our present space will admit of. We can only mention them briefly, and advise our readers to send for copies. They contain much valuable information and should be read carefully and preserved for future reference.

TRADE CATALOGUES

J. W. Penfield & Son, Willoughby, O., offer the trade a handsome book of nearly two hundred pages. It is their thirty-fourth annual catalogue of clay-working machinery and is one of the most complete and valuable works of the kind ever published.

C. W. Raymond & Co., Dayton, O., are out with a very neat and comprehensive catalogue of clayworking implements, of which they manufacture a large variety.

The Wellington Machine Co., Wellington, Ohio, offer a new catalogue for 1891, illustrating and describing the "New Quaker" Brick Machine and a full line of brickyard supplies.

The Frey-Sheckler Co., Bucyrus, Ohio, are ready with their thirty-ninth annual catalogue, which is bound in leather and seems too valuable a book to be given away. It contains cuts of all their latest improved machinery.

The Henry Martin Brick Machine Mfg. Co., Lancaster, Pa., have a new catalogue for 1891, showing the improved Martin Machine and other brickmaking devices.

Crossley & Grahn, Louisville, Ky., are sending out a catalogue of brick machinery. They make a specialty of fire brick making machinery.

W. E. Talleot & Co., Croton Landing, N. Y., have an illustrated catalogue of improved brickmaking machinery and brickyard equipments.

C. & A. Potts & Co., Indianapolis, Ind., have their annual catalogue ready and also a very neat and novel pamphlet, which they gave as a souvenir to those

attending the recent national convention of brickmakers, and which was greatly admired by all.

Fletcher & Thomas, Indianapolis, Ind., offer a neat catalogue of soft mud brick machinery and brickmakers' supplies.

The Brown-Frazier Mfg. Co., Portland, Ind., are mailing their fourth annual catalogue of the "Leader" and other stiff clay brick and tile machinery.

E. M. Freere & Co., Plymouth, Ohio, have a nicely illustrated catalogue of the "Ohio" Brick and Tile Machine, board, delivery cutting tables, etc.

The Walruth Run Foundry Co., Cleveland, O., have sent us a neat little book containing cuts and descriptions of their Improved Brick Cars, of which they make a specialty and manufacture a large variety.

The Wallace Mfg. Co., Frankfort, Ind., have a handsome catalogue of their line of stiff clay machinery, which will be mailed free on application.

IOWA TILE, BRICK AND DRAINAGE ASSOCIATION.

The Association met in the State House, in the City of Des Moines, February 4th, at 2 o'clock p. m. The reports from members showed an increased activity in the tile business, and a very lively interest among brick manufacturers.

The president, J. V. Boling, delivered the annual address, in which he congratulated the Convention for the advance achieved in the past year, and spoke encouragingly of the future.

A spirited discussion was had as to the best quality of paving brick, some of the members insisting that pavers should be vitrified, others expressing a preference for only partial vitrification.

It was generally agreed that the standard of excellence should be placed high. By so doing the merit of brick pavement will be fully established. It was conceded that many brick have been used in the past two years that were not as good as they should have been, notwithstanding their want of hardness they are standing the wear better than was expected.

The sizes used in building were recommended for pavers, then all rejected pavers can be used for building, and in any future repairs that may be needed there will be no difficulty in securing brick of the right size.

Sand was recommended in preference to hard foundations. That the street

should be brought to grade and rolled, then covered with four inches of sand, on which should be laid the first course of hard brick, side down, covering with two inches of sand, on which set upper course of hard pavers edgewise, breaking joints, the latter course to be set crosswise of the travel. The top course should be lightly covered with sand.

Some of the members insisted that the lower course of brick should be hard enough for top pavers, for the reason that in taking up the pavement to lay gas and water pipe—they would mix the brick to the detriment of the pavement if the lower course is not hard enough for top pavers.

Others mentioned that good hard brick, such as are used for paving sidewalks is in all respects sufficient, being placed as they are between two cushions of sand.

The following are the names of officers elect for the ensuing year: President, J. V. Boling, of Stanwood; vice-president, I. P. Smith, of North English; secretary, C. L. Smith, of North English; assistant secretary, G. S. Chambers, of Des Moines; treasurer, William Kettell, of Tipton.

A VISIT TO THE BRICK WORKS.

The Des Moines Brick Manufacturing Co., of Des Moines, Ia., extended a pressing invitation to the Iowa Tile and Brick Convention to visit their works, situated two miles west of the city. They arranged for a special train on the Wabash R. R. which set a parlor car and engine on the side track at the depot for the accommodation of the Association. Some forty members and others filled the cars and were soon on their way, arriving at the works about 2 o'clock p. m. Very many of the visitors were agreeably surprised at the extent of the works.

The cash capital of the company is \$100,000. They have erected a large plant situated on Coon river between the bluff and two lines of railroads that furnish competition in the shipping trade.

These works have been erected for the especial purpose of manufacturing paving brick.

J. W. Penfield & Son have put in a full line of their heavy machinery, guaranteed to turn out 80,000 pavers per day.

They have also put in a Penfield dryer, having a capacity of 100,000 brick.

They have erected, completed, and have in use, four Eudaly kilns each having a capacity of 250,000 brick, and they are building two more of the same kind.

There are probably a million or more of paving brick upon the yards, and we

have it to say, that they are the best in all respects of any large output of pavers that we have ever examined.

Mr. S. A. Robertson, the president of the company, informs us that in burning they have not a loss of more than three per cent. We examined a kiln that was being emptied and the uniformity of the burn certainly could not be excelled.

The preparation of the clays and the uniform methods of pressing the brick together with the quality of the clay has no doubt much to do with the success attained; but the brick as they come from the kiln speak very satisfactorily of the work all along the line.

The bank of clay is composed of different stratas, varying very much in their appearance and analyses, but mixed together as they are, so thoroughly, gives excellent results. The bank extends from top of the bluff (which is probably fifty feet in height) down to the possible depth of 100 feet, and will be sufficient for the use of this and succeeding companies for the next century.

On returning the visitors unanimously extended to Col. Robertson and other members of the company, and the Wabash Railroad, a vote of thanks for the favors and attention shown them. One and all said, "We are glad that we accepted the invitation, and have enjoyed the trip very much."

THE OHIO CONVENTION.

The next annual meeting of the Ohio Brick, Tile and Drainage Association will be held at Columbus, Ohio, Feb. 25th and 26th, 1891.

The meeting will be held in the A. O. H. Hall, 71½ North High Street. A large attendance is expected. The following is the

PROGRAMME:

- President's Address—W. A. Eudaly, Cincinnati, O.
- Gleanings from Ten Years' Experience Making Drain Tile—M. Horlocker, Columbus.
- Brickyard Construction—Geo. S. Tiffany, Tecumseh, Mich.
- Notes on Dry Press Brick Manufacture—W. D. Richardson, North Baltimore, O.
- Pressed and Ornamental Brick—C. W. Raymond, Dayton, O.
- Clays; their Nature and Adaptability to Certain Uses—Prof. J. F. Elsom, New Albany, Ind.
- Burning Brick in Chicago with Crude Petroleum—Chas. Purington, Chicago, Ill.
- The Black Swamp—D. O. Loy, Monticello, Ill.
- Approved Methods of Laying Pavements—H. S. Hallwood, Columbus, O.
- Address—D. V. Purington, Chicago, Ill.
- Tile and Brickmaking Combined—J. W. Everal, Westerville, O.
- Progress of Art—B. W. Blair, Cincinnati, O.
- Drying and Burning Drain Tile—Elliott, Rittman, O.

The Question Box will be opened at the close of each session. Reduced rail-

road rates have been provided for on the certificate plan. Each delegate must take a receipt or certificate from the station agent stating that a first-class ticket has been purchased which when countersigned by the Secretary of the Association, will entitle the member to a return ticket at one-third regular fare.

NOT AFRAID OF RESULTS.

Being anxious to place our kilns in direct competition with the best improved kilns for brick burning, we offer the following:

To any one using one or more of any of the improved kilns, who will erect one or more of our kilns of equal dimensions, and burn an equal amount therein as those in use, use the same quality of ware, handled with the same care, etc., read or have read at the regular meetings of all clayworking fraternities in the State in which the test is made, a true statement of the comparative results, give us one half of the net profits over the competitors, give us a satisfactory guarantee that these conditions will be faithfully fulfilled, we will give a right to build our kilns. The division of profits to continue five years, and a settlement made semi-annually.

We consider this a liberal offer—we share equally for five years, when our profit ceases, yours doubles, and continues indefinitely. STEWART BROTHERS. *
Mt. Victory, Ohio.

TESTS OF PAVING BRICK AND THE DURABILITY OF BRICK PAVEMENTS.

A Work of Great Value to the Paving Brick Interests, By Prof. Ira O. Baker, Champaign, Ill.

We have arranged for the publication of a most important treatise on the "Durability of Brick Pavements," that will undoubtedly prove of decided benefit to the paving brick interests throughout the country. The author, Prof. Ira O. Baker, is among the ablest and best known Civil Engineers in America and has been giving the subject careful consideration for several years. He has made many tests of brick and other paving material. The results are astonishingly favorable to brick. The matter will appear in future issues of the CLAY-WORKER and will also be published in pamphlet form for public distribution. It will prove a very valuable aid for the manufacturers of paving brick. Single copy 25 cents. Address T. A. Randall & Co., Indianapolis, Ind.

BRICKMAKERS' MANUAL.

We have now ready for delivery a new and very valuable book entitled, "Brickmakers' Manual," by R. B. Morrison, compiled and arranged with addition by J. A. Reep. It is an illustrated handbook for ready reference, and as a practical and exhaustive work on brick-making is undoubtedly the most valuable book ever published. The author, Mr. R. B. Morrison, is better known to the readers of the CLAY-WORKER as "R. Brick," author of "Hints on Brick-making." The book is a compilation of "Hints" with much additional matter carefully classified and arranged. It is handsomely bound in cloth, with gold title and embraces over two hundred pages. Sent postage free on receipt of price, \$3.00. T. A. Randall & Co., Indianapolis, Ind.

WILL YOU JOIN THE COLONY

Now organizing to locate in Maryland, between the Cities of Baltimore and Washington. Here are fine farming lands; low in price; adopted to EVERY branch of agriculture; an abundance of pure, soft water; delightful and healthful climate; near the best markets of the world; unsurpassed railroad facilities, with low freight and passenger rates, with quick time; educational advantages second to none; churches representing almost all denominations; refined and cultured society, etc. Only a few more wanted to complete the Colony, and if you want to join in one of the best opportunities of a life-time, now is the time. Farmers, business men, mechanics, and laborers, there is a chance for all. 100 per cent. profit easily assured in three years. Full information free of charge, furnished by M. V. Richards, Land and Immigration Agent, B. & O. R. R., Baltimore, Md.

CINCINNATI SEWER PIPE COMPANY.

(Successors to J. V. Nicolai.)

P. H. STRAUS, Manager.

Besides making Vitrified Stone Sewer Pipe we Manufacture and keep in stock a full line of

FIRE BRICK
FOR

Kiln Building & Boiler Setting.

Also Headquarters For

Cement, Lime, Plaster, Stoneware, Etc.

Office and Factory, Cor. Elm & Water Sts.,

Cincinnati, O.

Creeping Up the Stairs.

In the softly fading twilight
Of a weary, weary day,
With a quiet step I entered
Where the children were at play,
I was brooding o'er some trouble
Which had met me unawares,
When a little voice came ringing—
"Me is creeping up the stairs."

Ah, it touched the tenderest heart-strings,
With a breath and force divine,
And such melodies awakened
As no wording can define.
And I turned to see our darling,
All forgetful of my cares,
When I saw the little creature
Slowly creeping up the stairs.

Step by step she bravely clambered
On her little hands and knees,
Keeping up a constant chattering,
Like a magpie in the trees,
Till at last she reached the topmost,
When o'er all her world's affairs,
She delighted stood a victor
After creeping up the stairs.

Fainting heart, behold an image
Of man's brief and struggling life,
Whose best prizes must be captured
With a noble, earnest strife;
Onward, upward reaching ever,
Bending to the weight of cares,
Hoping, fearing, still expecting,
We go creeping up the stairs.

On their steps may be no carpet,
By their side may be no rail:
Hands and knees may often pain us,
And the heart may almost fail;
Still above there is the glory,
Which no sinfulness impairs,
With its joy and rest forever,
After creeping up the stairs.

EDITORIAL NOTES and CLIPPINGS.

Stockton, Ill., wants a brickyard.

Mapleton, Ia., is to have a brickyard.

Baton Rouge, La., is to have a new brickyard.

Genoa, Ohio, is to have a brick and tile factory.

Willard, Utah, is to have a brick plant in the spring.

Brazil, Ind., is developing into a great fire brick centre.

Jno. Mortimer will start a brickyard at Big Timber, Mont.

The St. Cloud (W. Va.) Brick Co. has built an artificial dryer.

Simon Cline has started a new \$15,000 brick plant at Reading, Pa.

The Higgins Mfg. Co., Beaumont, Tex., is building brick works there.

Miller & Nims of Key West, Fla., want to purchase 2,000,000 paving brick.

T. A. Dotson, Newport, Iowa, is in the market for a soft clay brick machine.

Frank Hartman is enlarging and improving his tile factory at Iroquois, Ill.

The Challenge Brick Works at Greenock, Pa., has been put in operation again.

P. F. Welch contemplates establishing a large brick plant near Montague City, Mass.

A company is being organized to establish a brick and tile factory at St. Joe, Mich.

Reilly & Pittenger, Pontiac, Ill., will probably build brick works near that place.

The Colchester (Ill.) pottery is now at work and is turning out a superior grade of ware.

The Akron (Ohio) Paving Brick Co. has been incorporated with capital stock of \$40,000.

Canton, Ill., is agitating the street paving question and will likely give brick a trial.

Edward Marks, North Penobscot, Me., will embark in the brick business there in the spring.

Joseph Marshall, a brick manufacturer, of Lawrence, Mass., died February 6th, aged 31 years.

Memphis, Tenn., is falling in line and will begin soon to pave her streets with vitrified brick.

The Terra Cotta Brick Co., of Galesburgh, Ill., will enlarge their already extensive works.

J. W. Ruby & Co., are organizing a company to establish a brick plant at Greenville, Ohio.

The Natchitoches (La.) brickyard is to be revived and put on a solid basis with increased capital.

A company has been formed and will at once set about starting large brick works near Epping, N. H.

Those wanting situations or experienced help should keep an eye on our "Wanted, For Sale, Etc.," columns.

It is claimed that extensive deposits of clay peculiarly rich in aluminum has been located near Chamberlain, S. D.

A new brick plant will probably be established at Waukegan, Ill., the demand for brick largely exceeding the present supply.

Moline, Ill., will put down some paving brick this spring and if the result is satisfactory brick will be used exclusively hereafter.

The Hydraulic Pressed Brick Company of St. Louis have filed a statement of increase of capital from \$2,000,000 to \$3,500,000.

Messrs. Alex. K. Rarig & Co., formerly of Columbus, O., have removed their foundry and machine business to Buena Vista, Va., where they have erected large works and are now prepared to fill promptly any and all orders for their machinery. See "ad." on page 238.

The New York papers now claim that Mr. Lorillard sunk nearly \$2,000,000 in the brick works at Keyport, N. J., which are now in hands of a receiver.

Argentine, Kan., is said to be a fine location for a vitrified paving brick manufactory. There is an abundance of excellent clay and other facilities.

The Barberton (Ohio) Brick Co. has been incorporated by Simon Dickerman, Wellington Miller, Alvin D. Betz and Orlando Wilcox. Capital \$15,000.

The Tower Grove Brick Works, of Belleville, Ill., has been incorporated by John Ringer, L. S. Bauer, Henry Paul and Robert Johnson. Capital \$30,000.

Webb City, Mo., is agitated over the location of valuable fire clays in that vicinity. A brick company will likely be organized by A. Brewer and others.

T. G. Beck and John Oldshire, brick-makers, at Birmingham, Ala., quarreled over a load of brick the 9th inst. and the latter shot and instantly killed the former.

Rushville, Ill., is rejoicing over the discovery near there of large beds of superior potters' and sewer pipe clay. A company is being formed to establish a factory.

Jas. H. Hensley, traveling man for Fletcher & Thomas, has gone to Mexico to erect a large brickmaking plant at Zacatecas. Will also put in another at Monteray.

Paul F. Schuster, E. H. Keeler and H. A. Block have incorporated the Superior Brick Co., of Rockford, Ill. Capital \$20,000. They will make fine white brick exclusively.

Fletcher & Thomas, Indianapolis, Ind. have just shipped a complete steam brickmaking plant to Jackson & Moss, Anderson, S. C., and one to Walter Tips, Austin, Texas.

At Fort Payne Ala., James Durham and G. A. Galler have completed arrangements for the establishment of a plant for the manufacture of all kinds of fancy brick and paving material.

We call special attention to the "ads." of John Torrens, Muskegon, Mich., (page 231) and R. H. Reppell, Kansas City, Mo., (page 236) as they are new candidates for trade favors.

After experimenting for some time with brick machinery, the Peerless Brick Co., of Chicago, Ill., purchased two double Whittaker Brick Machines and are operating same with gratifying results. They are also using oil as a fuel for burning

O. A. Derrough, of Champaign, Ill., will build a model tile factory in Iroquois Co., that State, and wants to hear of all improvements in clayworking line and will be glad to receive circulars and prices on machinery and steam pipe for heating purposes.

The Adamantine Paving Brick company was chartered recently at Charleston, W. Va., with a capital stock of \$500,000. Immense beds of fire clay, recently discovered there, will be developed.

Robt. F. Morris, 512 N. 7th St., Richmond, Va., would like to correspond with parties desiring to purchase valuable clay lands in that section or to establish brick or terra cotta works there.

The Granite State brick company has about twenty teams drawing wood and logs to their works near Epping N. H. This is a feature in brickmaking that western brickmakers know little about.

Good, practical, reliable workmen are always in demand. Those competent to superintend and manage brick works can readily obtain desirable situations by making proper announcement in our "Wanted" column.

The Weber La Bohn Brick Company of Chicago has been incorporated with capital stock of \$100,000, to manufacture brick, tile, terra cotta, and artificial stone; incorporators, Bernard F. Weber, F. W. La Bohn, John P. Foerster.

H. Jarden is superintending the erection of a large steam power brick plant at Shendun, Va., consisting of a "New Quaker" machine, and 30 h. p. engine, furnished by Fletcher & Thomas, of Indianapolis. The same parties will also establish a similar plant near Glasgow, Va.

O. A. Derrough is building a brick and tile plant near Buckley, Ill. Is putting in an outfit from the Adrian (Mich.) Brick & Tile Machine Works, and a 50 h. p. engine and boiler made by Robinson & Burr, of Champaign, Ill. Mr. D. thinks he will have a model plant when completed.

D. J. McMillan, of South Washington, N. C., has a large tract of valuable clay and timber land which he desires to trade for a complete brickmaking outfit. He writes that it is well located, near a good brick market. He will be pleased to correspond with anyone interested in that direction.

The Savage Fire Brick Company, of which J. J. Holitzell is president, have extensive works at Keystone Junction, Williams Station and Hyndman, Pa., and Bessemer, Alabama. The product of these works last year was 16,000,000 brick. The daily product of the Bessemer works is 25,000.

If our readers will simply write the words "CLAY-WORKER" on the margin of their letters when writing to our advertisers for circulars, etc., they will confer a favor both on us and the advertiser. The latter is anxious to know the source of the inquiry and the words "CLAY-WORKER" will tell the whole story.

The J. A. Blaffer Brick & Lumber Co., of New Orleans, has been dissolved and a new company organized under the firm name of J. A. Blaffer & Son. It is virtually a change of name only, as the new

firm assume all liabilities and will continue the business of manufacturing building and pressed brick and tiles.

Many manufacturers are now arranging for various improvements in their works for the coming season. The putting in of new machinery of larger capacity will leave them with small machines and appliances that are to all intents and purposes as good as new, which may be easily disposed of by a small "ad." in our "For Sale, Wanted, Etc., column.

A contract has been let to the McIntire Bros. of Buffalo to build a dam at Thomson, Minn. for the St. Louis River Water Company to utilize 6,000 horse power, giving a fall of ten feet and allowing the passage of logs over it. The dam must be completed and turned over to the company April 1, 1891. The power will first be utilized to operate a state pressed brick works.

Prof. R. A. F. Penrose, Jr., of the Texas Geological Survey, says the finest of clays suitable for the manufacture of fire brick, earthenware and even fine china ware, are to be found abundantly in East Texas. Two companies are now engaged making pottery at Athens, in Henderson County. Equally fine clays abound near Jefferson, in Marion County, and near Rusk, in Cherokee County.

Mr. Alfred Arnold, of Canal Dover, O., was registered at the Bates House during Convention week. He came to represent the Arnold Dryer, and Street Paving Block, and was a regular attendant at the meetings of the Association. He brought with him splendid samples of red brick and fire brick. Mr. Arnold reports a very encouraging outlook for the successful introduction, during the coming season, of the drying system with which he is connected.

The thanks of the N. B. M. A. is due to Mr. L. J. Howard, of St. Louis, who kindly loaned the picture of the enameled tile panel which was on exhibition in the ante-room during the convention. Mr. Howard saw the original panel when in Europe last summer, and was so much pleased with it that he secured a photograph. It is indeed a beautiful piece of work, being a representation of the life of the prodigal son, and is one of the best productions of the famous Doulton Art Tile Works of London.

A company has been organized to manufacture vitrified paving brick and terra cotta ware with capital stock of \$100,000. Directors: Capt. J. D. Barker, president, Girard, Kan.; Gen. Thos. M. Carroll, vice-president, Paoli, Kan.; D. C. Goodrich, secretary and treasurer, Leavenworth, Kan.; Gen. U. B. Pearsall, Fort Scott, Kan.; Major Homer W. Pond, Ft. Scott, Kan. Place of manufacture on line of Missouri Pacific R.R., in Franklin Co., six miles west of Oswatomie, Kan. The company has 50 acres of very fine clay about 30 feet deep, which has been thoroughly tested and found to produce an exceptionally hard and tough paver. Operations will begin at once.

Frederick, Ill., has now a brick works in successful operation. Messrs. Rebman and Dering are the promoters of the enterprise and are using the Whittaker Semi-Dry Brick Machine. They burn their brick in round down draft kilns. They have an extensive bank of excellent clay, which burns a fine red color. They report they have all the orders they can possibly fill from the Chicago market.

Messrs. Collins & South, of Columbus, O., have commenced the manufacture of superior building brick, and have put into their works the Whittaker Dry or Semi-Dry Press Brick Machine. Their material is "variegated shale" and works well, and makes an elegant product. Mr. South was until recently superintendent of the Fish Pressed Brick Co., of Columbus, Ohio, who have made a lasting reputation for their excellent quality of building brick.

The Marion Steam Shovel Co., of Marion, Ohio, are having a very satisfactory trade. This firm has made a specialty of steam shovels for brickyard use and have been very successful, their Shovel being undoubtedly the best on the market for that purpose. The death of Mr. Barnhart, the inventor of the Shovel, which was noticed in our last issue, will not effect the business of the firm in the least, as it has been in charge of Mr. G. W. King for several years past, in fact Mr. King has been associated with Mr. Barnhart since the Shovel was first placed on the market.

The Willapah River Vitrified Brick Co., South Bend, Wash., has been incorporated with a capital stock of \$50,000, by F. T. and C. M. Hamshaw, Wm. B. Adair, Wm. Brilker and Wm. Bonner. The plant will turn out plain and ornamental face brick, ornamental terra cotta, tile and sewer pipe and vitrified brick. Vitrified brick for street roadways will be their specialty. Their material is waste deposit from a shale mountain on the banks of the Willapah River, where they have 28 feet of water for shipping purposes. Portland, Tacoma, Seattle and San Francisco will be their markets. Three kilns have been burned and all tests have been satisfactory. The plant is well equipped with improved machinery and a dryer with a capacity of 40,000 brick per day.

HANDLING CLAYS

The cost of handling the clay from the bank to brick machine can be very materially reduced by the use of proper hoisting machinery. Much light on this subject can be gleaned from the new catalogue of the Lidgerwood Mfg. Co. 94 Liberty Street, New York City. The book is the handsomest machinery catalogue ever seen in this office, and is a valuable book of reference. Send for it, it is designed for free distribution.

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A VALUABLE BOOK.

FREE TO BRICKMAKERS.

We are in receipt of a very large and handsomely gotten up book from the Frey-Sheckler Co. of Bucyrus, O. It is bound in leather and the firm's name and address appears on the outside cover in gold letters.

It is so handsome and rich in appearance that at first glance we said, "Ah! here is something nice in the way of a souvenir." But on lifting the lid we read "Twenty-ninth Annual Catalogue of THE FREY-SHECKLER Co., and realized that it was a souvenir and something more—a business announcement or trade catalogue that should find a safe place in every American clayworker's office.

The catalogue is not only a handsome book, but is carefully arranged and contains much valuable information on many practical questions of importance to all brickmakers both young and old. The Frey-Sheckler Co. now offer the trade nine different brick machines with a capacity of from 10,000 to 80,000 per day each, according to size.

One feature that brick makers will be especially interested in is the illustrations and descriptions of the various cutting tables for stiff clay machines of which they have several designs including both hand and automatic. In fact, there is scarcely anything in the line of plastic clay machinery that is not represented in this book and there is also represented a line of soft or tempered clay brick machines, pug-mills, clay crushers, dry pans, represses, dumpcars, brick trucks, elevators, engines, boilers, in short, any and every thing needed about a modern brick plant. Every brickmaker should have a copy of this book which will be sent free on application to the Frey-Sheckler Co., Bucyrus, Ohio.

See ad. on page 281.

THE CLAYWORKER.

VOL. XV.

INDIANAPOLIS, IND., MARCH 15, 1891.

No. 4

Written for the Clay-Worker.

EXAMPLES OF AMERICAN BRICK AND TERRA COTTA WORK.

No. 36.

A TERRA COTTA FIRE PLACE.

THE accompanying illustration is of a terra cotta fire-place designed for the corridor of the Bates House in this city. It is an apt design, illustrating the highest principle of art—how to fit the prettiest thing possible for the place it has to fill. A statue of Venus, by Praxitiles, is artistic and pretty, but it would be somewhat out of place in a hotel corridor. A fire-place, however, is a necessity. A "cannon" stove might furnish sufficient heat but it would be entirely incongruous in the corridor of the Bates House, surrounded with costly fixtures, elegant frescoes, and tessellated floors, in fact, our prejudice against the "cannon" stove is so intense that we would prefer to shiver rather than be warmed by one. We all know it—its conception, birth, and ways of life are those of the American railway station.

This fire-place is just where it belongs. It would fit nowhere else, and nothing else would better fit this place. A modern first-class hotel has many guests, who wish to warm their shins, and be comfortable; it therefore requires a large fire-place. It must economize space, and hence cannot give up the whole side of a large room to it. This design boldly comes out into the room it is a matter of some tact how to do it gracefully. It is done here, as the picture shows. Around the base of the semi-circle two large arches joined by straight walls, cut the circle into a polygon, which is made into a circle

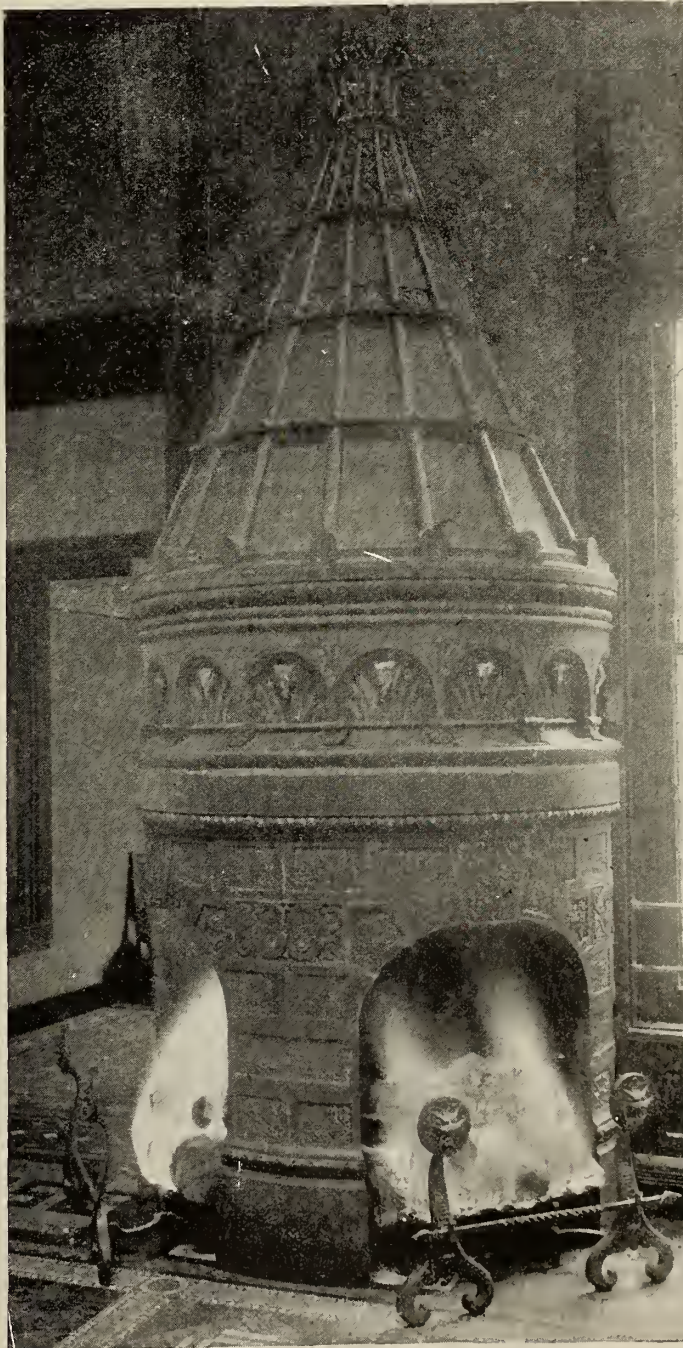
around the frieze; this gracefully retreats back to the wall in a cone, surmounted by a crown, the plainness of the cone broken by ribs concentrating in the crown, and crowned by circles at regular intervals. Its height is 15 feet and its proportions and design are so fitting that

it is a real ornament to the room, having none of the obtrusiveness of a mere fire-place, due, perhaps, as much to the soft undertone of terra cotta, as to its form.

HOW AND WHAT TO READ.

You should treat a book as you would a person with whom you are talking for information; that is, question it, read it over and turn back and try to get at the meaning; if the book itself does not answer the questions you raise, go to some other book, ask a dictionary or encyclopedia for an explanation. And if the book treated in this way does not teach you anything or does not inspire you, it is of no more service to you than the conversation of a dull, ignorant person. I just used the word "inspire." You do not read all books for facts or for information merely, but to be inspired, to have your thoughts lifted up to noble ideas, to have your sympathies touched, your ambition awakened to do some worthy or great thing, to become a man or a woman of character and consideration in the world. You read the story of a fine action or a heroic character—the death of Socrates, or the voyage of Columbus, or the sacrifice of Nathan Hale, or such a poem as "The Lady of the Lake"—not for information only, but to create in you a higher ideal of life, and to give you sympathy with your fellows and with noble purposes, and therefore the best literature in all the world is the best for you to begin with. And you will find it the most interesting.—*Charles Dudley Warner, in January St. Nicholas.*

How much sooner it gets too dark to saw wood than it does to play lawn tennis.—*Ex.*



FIRE-PLACE—BATES HOUSE, INDIANAPOLIS, IND.

Written for the Clay-Worker.

THE FUEL QUESTION.

No. 5.

SMOKE, ETC.

DEAR WILL:—You appear not fully able to comprehend my last letter on clinkers, ashes, etc. I think this is due to hastily glancing through it, and laying it down without giving it sufficient thought and attention. I must, therefore, advise you to read it again, carefully, and do not raise objections to points you do not fully understand—a thorough understanding will clear it up for you.

These letters are intended to enable you to link together all the conditions necessary for the complete combustion of fuel, as far as it is practicable on a large scale, therefore, pay proper attention to each and all of them.

I may just state here, that you have a great deal to learn yet, and much also to unlearn, and in this letter I am anxious to eradicate some of the opinions you entertain concerning smoke. I am well aware that a great many people, much older, with much wider experience, and better informed than you are, entertain the same and similar erroneous opinions, on this subject, so prepare yourself for a merciless onslaught on some of your cherished and settled convictions.

With all due deference to engineers, firemen, brick burners, etc., whose experiences have been gained by years of daily toil and practice, which has enabled them to investigate the subject thoroughly from a practical standpoint, and which entitles them to much consideration, and their deductions to a careful examination; still it is to be deplored that so many of them entirely ignore the theoretical side, from a *scientific standpoint*; their theory is based solely on their own observations, and ends there, and therein arises the error.

It is surprising how many there are, who are unable to arrive at any rational conclusion concerning smoke; they know how to cause it, and in some instances how to prevent it, but its composition, and value, are qualities on which their ideas are very vague, and varying. Some have an idea that the long train of smoke they see floating away is neither more nor less, than about half the fuel they have just shoveled into the furnace, making its escape into the atmosphere unburnt. Now this is a very common, but a great mistake. The *visible* fuel (carbon) in the smoke, is in such insignificant quantities as to be practically

valueless. Some men, like yourself, have bestowed a great deal of time and labor, inventing methods for burning this smoke, but when I show you how expensive, and how impracticable are such contrivances, I trust you will waste no more time pursuing, as it were, such a phantom. Devise something, if you will, for the *prevention* of smoke, but let it go if it is once made, never again waste your time trying to reclaim it. Consider well the following quotation from the "Engineer's Handy Book" by Steven Roper. He says: "*A grain of soot distributed evenly in fine particles through a cubic foot of steam, would color it blacker than the ace of spades.*" He says much more on this subject well worth your reading. I would like you also to read "Combustion of Coal and Smoke" by C. Wye Williams, you will find much in it that will be very interesting, and of great value to you. A more recent work, however, and one in which I took a great interest, is, "Barr on Combustion." Make extracts in your note book from these works, and from magazines and periodicals in which you will occasionally see this subject treated.

The following is an extract I made in my note book of a lecture delivered in Glasgow, in 1874, by W. Allen Carter, C.E.:

"When carbonic oxide is formed, only *three-tenths* of the evaporating power of the carbon is given out, the remaining *seven-tenths* being given out when carbonic acid is formed. The gaseous portion of coal being only partially burnt produces *smoke and soot*, caused generally by insufficient air *above* the fire, or by coming in contact with cold surfaces, and being cooled down below the temperature necessary for the ignition of the gases.

"Smoke is not the only indication of waste fuel.

"Gas and smoke are not synonymous terms.

"Sometimes a great waste of fuel takes place without any smoke being visible.

"We must challenge the idea, that a furnace can consume its own smoke; that is simply impossible, we can construct a furnace to prevent the formation of smoke, but let it once be formed, and it cannot be consumed in the same furnace, its presence indicating, that the furnace is wanting in those conditions essential for complete combustion."

Let us now examine smoke, with a view of getting at its composition; we shall then be better able to judge of its value as fuel, and to see if it is worth reclaiming and feeding into a furnace again for the production of heat. To

simplify matters let us suppose the smoke to be free from carbonic oxide, and the furnace producing the smoke, to be consuming 80 pounds of bituminous coal per hour, and the composition of the coal to be 60 pounds carbon, 8 pounds oxygen, 1 pound hydrogen and 11 pounds incombustible matter, or ashes.

For the complete combustion of the 60 pounds of carbon there would be required from the atmosphere 160 pounds of oxygen, and this would be accompanied by 535.65 pounds of nitrogen, or a total of 695.65 pounds of atmospheric air; this is the quantity required by theory, but in practice—as I have told you before—double this quantity is required to compensate our imperfect arrangements for supplying our furnaces with air; so we must now double our 695.65 making our actual requirements 1,391.30 pounds. I want you to think this matter over for a few minutes, for it will lead you on to a truer conception of the general composition of smoke, and thence to its utter worthlessness as fuel.

To return then to our calculation of the air necessary to burn the 80 pounds of coal; of this 1,391.30 pounds of air, 1,071.30 pounds are nitrogen, mark you, over half a ton of nitrogen passing through the furnace and up the smokestack every hour. Leaving out of the question for the present the moisture and other impurities in the atmosphere, and viewing it as simply nitrogen and oxygen, we then have issuing from the smokestack —

Steam or water vapor..	9.00 lbs.
Unconsumed oxygen..	160.00 "
Carbonic acid.....	220.00 "
Nitrogen	1,071.30 "

Making a total of...1,460.30 "

1,460.30 pounds of *incombustible*, also transparent matter ejected from the furnace into the atmosphere every hour.

This is, however, a case of supposed perfect combustion, and of course no smoke made, we must therefore introduce a case of incomplete combustion, and make smoke, to elucidate the fallacy of burning it.

Taking it for granted then, that a grain of soot will thoroughly blacken a cubic foot of steam or other gases; 2½ pounds of unconsumed carbon would be ample to render inky black every cubic foot of the gases leaving the smokestack in the case just alluded to, for one hour. Now we will suppose this 2½ pounds of unconsumed carbon to be wasted by cooling surfaces in the furnace and the lack

of say about 7 pounds of oxygen, it would not materially alter the figures given above to further convince you, if needs be, of the utter worthlessness of real good black smoke for its carbon's sake. Look the following over:—

Unconsumed carbon....	2½ lbs.
Unconsumed oxygen....	153 “
Carbon acid.....	211 “
Nitrogen.....	1,021 “

Total.....1,387½ “

I think by this time,—if you have carefully followed me through this letter—you have arrived at the conviction, that smoke burning theories and appliances are delusive, and very misleading, you will also see that the fuel wasted as smoke alone, is altogether too inappreciable, to demand any attention in the *economy* of fuel. There are, however, other considerations, which will justify the adoption of means to *prevent* smoke, especially in large manufacturing cities and towns, where the deposition of soot soon becomes a nuisance.

Waste no more time on smoke burning, nor even smoke prevention, if fuel economy is the end in view; think of treating nearly 1,400 pounds of incombustible gases to reclaim about 2½ pounds of soot! Think of going to any expense to prevent this waste, 60 or 80 pounds of coal in 24 hours!

There are much richer fields in the economy of fuel than smoke catching, or smoke saving, and remember what I have said before in these letters, that by far the greatest waste of fuel, escapes unseen; remember the statement of Allen Carter, in the first part of this letter; that when carbon is only burnt to carbonic oxide, only three-tenths of its heat is generated, and if it is allowed to escape up the chimney in this state, there is evidently seven-tenths of that fuel wasted by this single circumstance alone, not counting the further losses by radiation, conduction, etc., in which no useful effect is produced.

There are two rules which cover the ground in a general way in economizing fuel. First, generate the largest amount of heat possible with your fuel, and, second, utilize as much as practical, of that you generate. Yours paternally,

HYDRO-CARBON.

SHORT AND SWEET.

28A SALT LAKE CITY, Jan. —, 1891.

Editor Clay-Worker:

The advance on subscription is acceptable and cheap at that. W. S. SIMKINS.

SOME NOTES ON DRY PRESS BRICK MANUFACTURE.

BY W. D. RICHARDSON.

On the excursion of brick manufacturers to Marion, Ind., I overheard some criticisms upon the programme of the convention which had just been held by our National Association. One member was dissatisfied that so much time had been given to the dry press process, and another thought that the executive committee had taken very little interest in the selection of subjects and that our secretary had been unduly influenced by the dry press men. A few days later I met in Canada a member who was building there one of his patent dryers. He had left his work to attend the Indianapolis convention, and, being asked upon his return, how he liked the meeting, replied: “It didn’t amount to much—the dry fellows had it all their own way.”

Now, if the above criticisms represent the sentiments of the body of the National Association, and also of the Ohio Association, it places me in rather an embarrassing situation. I have been requested to speak to you upon this same *dry* subject that has been so much depreciated; but I will read only a few of the “Notes” I have taken, and which I have condensed as much as perspicuity would allow. I am not much addicted to “speakin’ in meetin’” anyhow and would not think of coming before you to-day were it not, that being urged by your secretary, I could not say no, feeling as I do, so largely indebted to this Association for the instruction I have received from the records of its previous meetings. Moreover, I cannot but believe that this repugnance to the discussion of the dry process at our conventions comes, not from the brickmakers themselves, but from those representing the machinery and dryers used in other processes. Every earnest, genuine, progressive brickmaker is interested in all the branches of his art, while the machine manufacturer or agent is opposed to all processes and methods except his own. At any rate it would be impossible to prepare a programme each year with new men and new subjects, that would please everybody, and I am sure that our secretary would gladly delegate this task to any of these fault finders that would promise to perform it conscientiously. Judging from the inquiries that I receive, the interest in the dry process of making brick is sufficient to

justify all the attention that was given it at our recent convention.

My subject does not require me to give a description of the process of making dry press brick, which is now more or less familiar to all of you. The methods and machinery employed are being improved every year, making the results more certain and satisfactory. Yet there is still plenty of room for improvement, and it should be the object of such gatherings as this to discuss these improvements, to give as well as to receive, to report our failures as well as our successes, so that after this interchange of ideas we may go back to our work with renewed zeal and vigor, reinforced and strengthened for the struggle with the trials and difficulties that beset the path of the worker of clay.

The very first step in the dry clay process, the harvesting of clay, is still in the most primitive condition. During the past year I have advanced this a little by using steam power to cut up the clay and to scrape it into windrows; but I have not as yet found anything better than shovels and carts to convey the clay to the sheds. He who will invent a machine that will load and carry the clay into the sheds with less trouble and expense than the present method, will deserve a medal and make the dry process more popular.

Passing over the making of the brick, which is now pretty well understood, the next operation most in need of improvement is the burning. I merely mention this subject as I could not do more without repeating what I have already said and published. The importance of good burning is realized by every manufacturer, and causes him more anxiety than all the other operations combined. I know of no way he can improve the burning save by giving it his personal attention, watching and studying it day and night, and keeping a careful record of his observations and experiments; thereby making himself master of this as he does of the other departments of his business.

I am often asked to recommend a burner; but I hesitate to do this, even if I know one who is seeking such employment, for somewhat the same reason that Talleyrand always declined to recommend a cook or a medical man, because he did not wish to be held guilty of murder as an accessory before the fact.

In the manufacture of common brick, when the brick have been burned they

are ready for the market, and the expense already incurred represents nearly the total cost of the brick; but in the pressed brick business the further operations of sorting, shading and grading, and piling and loading double the previous expense, not to mention the extra cost of marketing and the interest on the capital invested in a stock of two to three hundred piles of different shapes and shades. Machine men and promoters of the pressed brick business say nothing of this, and doubtless do not realize it, and those proposing to engage in it do not take this important matter into consideration.

I am going to take this opportunity to give my answer to a few of the inquiries that I receive in regard to the dry press process.

1. What kinds of clay are adapted to this process?

Not many years ago it was believed that only of a very few clays could a good dry press brick be made; some going so far as to say that the St. Louis clays alone were adapted to this process. I suppose that even this exception would not have been made were it not that the superior quality of the brick made there by the pioneers in this process, could not be questioned. It is interesting to read with the light of to-day some of the old volumes of the CLAY-WORKER upon this subject, or the reports of the first conventions of the National Brick Manufacturers' Association. A few years ago I published the opinion that more clays could be worked successfully, without mixture of other material, by the dry process than by any other. Since then I have made practical tests of a variety of clays from different parts of the country, and, in only two or three cases have failed to get a good merchantable brick by this process. I do not mean by this that with any large number of these clays the manufacture of dry press brick would prove a successful business, but that the clay itself could be worked by this process into a hard, firm, durable brick. It would be easier for me to answer this question negatively, by stating what clays will not make a good dry press brick. Clays too strong for other processes will work well by the dry process, as also will some very weak clays containing a large percentage of fine sand. The method of preparing these different clays for the press should be varied to suit the clay and press. Shales and heavy clays work best by this process. Some very fine, light clays are difficult to press dry and will not make a hard, solid, ringing brick. Not enough is known of the effects of the many different combinations of elements and their proportions found in clays to judge definitely from a chemical analysis what the results will be in practice, so that it is always safer to trust to a practical test made by disinterested parties.

2. Can the dry process be employed successfully for the manufacture of common brick?

Those interested in the sale of dry press machinery say yes, while those in-

terested in other machinery and dryers say as emphatically, no. This question cannot be decided upon the quality of the brick produced, since no process can equal the dry press for quality—save that the smoothness of the sides is often objected to on the ground that it does not make as good a bond as the rough soft-mud or plastic side-cut brick; but this objection can be easily overcome by placing a panel on the top dies. The question then hinges upon the cost of production. Can merchantable common brick be made as cheaply by the dry press process as by any other? This is one of those questions, like the "hand versus machine made brick" logomachy in the journals, that cannot be answered by yes or no. In the language of honest Sir Roger de Coverly, "Much may be said on both sides." The conditions are so variable that while I firmly believe that the dry process will never be popular for the manufacture of common brick, yet I do not say that under no circumstances can it be made successful. I always give it as my opinion in answer to this question, that for the manufacture of common brick *exclusively* the dry press process cannot be made profitable. If the clay burns a color suitable for face brick, the business of making common brick and face brick by this process can often be successfully combined, as at St. Louis and a few other places. I must say, however, that the rage for novelties in color of face brick makes it possible now in our large cities to sell almost anything—in fact the more off color the better. That this variety in color of face brick is having a pleasing effect in the appearance of our cities cannot be denied, and it is to be hoped that this newly developed taste will be lasting.

3. Is the dry press process suitable for paving brick?

In my answer to this question you must understand that I am speaking solely from my experience with the dry press process, and not from any experience in the manufacture of paving brick. However, I have read with interest all that has been published in the CLAY-WORKER upon paving brick, and have been a constant reader of *Paving and Municipal Engineering* from its inception. I have carefully studied the tests of paving brick made by engineers, and think I am prepared to say whether or not a suitable paving brick can be made by the dry process. When I assert that as far as all the qualities required in a good paver are concerned, no process can equal the dry press, I do not do it inconsiderately, however much it may be derided. I will, moreover, back up my assertion with the offer that if any one has a clay that makes a good paver by the process he employs, if he will send me two or three barrels of it, I will make him a better paver by the dry process, if he will pay the expenses of such a test. If these statements should provoke discussion at this meeting, some one will doubtless ask me to name a place where paving brick are made by this process,

and I will be unable to do it, and this will afford him much satisfaction. So he might have asked a few years ago one advocating the making of any kind of brick by the dry process to name a man that was doing it successfully. He would then have argued from the fact that no one was doing it, and that many had attempted it and failed, that hence no one could do it. There are many brickmakers that have never examined a well-made dry press brick, such as are being turned out to-day. Their idea of a dry press brick is a coarse, granular, though shapely, mass of half burned clay, such as we used to make when the process was in its infancy. Many still believe that a dry press brick will not stand the rain and frosts. In order to get our hard culls into use for side walks in the town where I manufacture I was obliged to guarantee to replace any that showed undue wear; but now I can furnish abundant evidence that our brick will outwear the soft-mud and stiff-mud brick made of the same clay. One of the severest tests of these qualities of brick is in sewers, and it was a long time before any city engineer could be induced to lay aside his prejudices and try them; but to-day they are sought after for such purposes. In this city of Columbus, the Fish Brick Company made last year eight millions of dry press brick, nearly all of which were used in the sewers of this city.

I have no pecuniary interest in any dry press brick machinery and do not mean to urge anyone to adopt this process for paving brick, as I am not positive that it is the best, but, were it in my line, I would try it. As to the quality of brick, provided one has the requisite clay, facilities and knowledge, he need have no fears. As to the cost of manufacture compared with the process of dry-pan, wet-pan or pug mill, plastic cut-off machine and repress, and dryers, he will have a decided advantage. But I have said enough upon this question—the last that I shall discuss—more than I would have said had the subject of paving brick been upon the programme of this convention.

The use of pressed brick for fronts is increasing rapidly each year owing chiefly to the improvement in quality and reduction of price brought about by the development of the dry press process. In 1880 there were made in Ohio between one and two millions of pressed brick, all molded and pressed by hand. In 1890 there were made in Ohio, about thirty-five millions of pressed brick—more than thirty-two millions or about 90 per cent. of which were made by the dry press process!

Whatever may be thought of the adaptability of the dry process to the manufacture of common brick or paving brick, all will agree that it is THE process for the manufacture of plain and ornamental brick and tiles for fine fronts and for inside work. I say "all," but perhaps Bro. Raymond, who is to follow me, will not only differ with me in this, but will lead you to an entirely different conclusion. I have known him a long time,

and can say that whatever may be thought of his ideas of "Pressed and Ornamental Brick," as to Raymond himself there can be but one opinion, "*He's all right.*"

PRESSED AND ORNAMENTAL BRICK.

BY C. W. RAYMOND.

Deviating somewhat from the usual custom of beginning an essay with an apology, I offer none, and trust to my friends, the brickmakers, to supply this important, and, doubtless, much needed omission.

The thoughts which I present are not those derived from rough and practical experience on the brickyard. They are not indelibly impressed on my mind by financial loss. I have never bought a brick machine. I have never worked fourteen hours a day for five days, to sit serenely by on the afternoon of the sixth to see the results of my labor scattered to the four winds or unceremoniously destroyed by a drenching rain. I have never been on the yard at night and witnessed the gentle and sweet placidity that hovers over the countenance of the "burner" as he quietly settles himself down in a warm nook or corner to enjoy his night's repose. I have never had my employes, in the height of a busy season, feed the insatiate appetite of the brick machine or pug mill, or crusher, with the indigestible crowbar or pick axe, causing a two weeks' stoppage for repairs thereby. I have never sat down and written to the unsuspecting manufacturer of the aforesaid broken machine, describing the occurrence as follows:

"MY DEAR SIR:—Owing to a defective casting in your machine it broke down yesterday while it was pursuing the even tenor of its way. The main mast is broken, the jib boom is dislocated, and the hull is fractured; in fact the whole machine is a wreck.

"We estimate our loss—25,000 bricks a day for 14 days—at \$1,500. We have given you credit for the purchase price of the machine, \$650, now due, notwithstanding nothing remains to us but broken castings. The balance you will please remit to us at your earliest convenience."

No, as I said before, I have escaped all these, and offer the suggestions herewith from results collected by long association with one of my more unfortunate brothers, those who have done the experimenting, and hope to place such ideas before you as will enable you to profit by the experience of others.

In our recent National Conventions, exhaustive papers on the subject in hand, showing careful thought and preparation, have been read and discussed by able and experienced advocates, hence very little that is new now remains to be said. Your indulgence, therefore, will be appreciated if my paper fails to advance anything startling in its originality.

It would be folly for me to undertake to formulate any rules or specific mode of procedure applicable to all cases, these

I find, are as varied as the yards themselves. While much can be said that will aid you, yet it is an undeniable fact that much more remains that can only be learned by experience with your clay, and conditions by which you are surrounded. These govern largely, not only your manner of working, but the quality, quantity, and the profit on your output as well. In many years of observation, I do not know of two yards who use in detail exactly the same methods. My remarks, therefore, will be of a general nature and such as will apply in a large measure to all manufacturers of repressed brick.

Among the many questions which, as a manufacturer of machinery, I am called upon to "air my knowledge of" is this, "Tell us the best method of making fine front brick." I will endeavor to answer to a limited extent this "unlimited" question.

PRESSED AND ORNAMENTAL BRICK.

The subject is susceptible of almost infinite expansion and elucidation. Shall I speak of the aggressive achievements of the dry clay process, the acknowledged success of the stiff clay, or the time tried and proven manner of manufacture by the soft clay process? All have their advocates, each has its advantages. I will not consume your time, however, by a description of what, in my opinion, should constitute a special subject of its own, and which has been so ably presented in the preceding paper by Prof. Richardson, "The Dry Press," but rather treat of the manner of making repress and ornamental brick from plastic clay.

I am not of those who claim that all clay will make a good pressed brick, notwithstanding, I believe that all clay, or rather, all brick can be improved by repressing. Why not? The pressure is applied to the gluts when they are in their last stages of plasticity, evaporation has largely ceased, hence they are well calculated to hold, not only the perfect shape given them by the repress, but their fine edges and corners and finished surfaces as well.

I strenuously advocate the advisability of having certain days on which to "strike out" brick for repressing. Special care can be better given to the preparation of the clay; the machinery, belting, molds, presses, etc., can be cleansed and oiled for the occasion; dry clay or hard articles removed from the machine or pug mill; the drying floor, pallets and racks, be swept and removed of all dirt and dust; the brick machine can be run at a slower speed to admit of time being taken to give the best results in handling; in fact, the rush and hurry incident upon making large numbers of common brick can be avoided. Again, in striking out brick for repressing, it is necessary that an extra amount of clay should be contained in them.

First, to compensate for condensation given them by pressure.

Second, pressed brick when laid in the wall, require a much smaller mortar joint than common ones, hence to bond

with them properly they must be thicker; therefore larger molds are required. These and other reasons present themselves why it is advantageous to have stated days or times for this work.

I would not advise my friends to attempt to make pressed brick without satisfying themselves that their material is suitable, either in itself, or susceptible of advantageous combination. This should be determined by an actual test by a practical burner. A chemical analysis is of inestimable value in determining the presence of alkalis or other impurities which cause so much efflorescence in many of our fine fronts. The novice, however, need not be discouraged if his first trial does not "pan out." If it does not indicate that he has made a rich "find," additional experimenting, combination, or chemical treatment may later on develop the fact that he has struck "pay dirt."

The manner of preparing the clay and striking out the brick for making pressed brick is identical to that of making common brick, except perhaps the precautionary measures that are taken to insure the very best results. It seems unnecessary for me to describe a process so well known to you all. Weathering is usually advisable. It is a great help in the tempering or pugging of the clay, as the assimilation caused thereby lightens the work on the machinery and produces a thorough mixture of the strata.

It is important, first of all, that the clay be free from stones, roots, and all foreign substances. Judicious work of the pit men in "weeding" out the largest of these at the clay bank is commendable. Frequent stoppages of the machinery is avoided, and its liability to breakage reduced to a minimum.

If stones abound in any quantity they should be separated from the clay by a roller crusher, or if they be not large and of a limestone formation, a disintegrator or pulverizer to reduce them will answer. In the latter contingency, the crushed stones form an integral part of the clay and are worked up with it. Experience alone can demonstrate whether they deteriorate its quality or are otherwise objectionable.

The pugging process which follows is one of importance, as upon its thoroughness depends largely the uniformity of your material. A pug mill, in addition to the one which usually forms part of the machine, relieves the latter of excessive strain and better prepares the clay for all future work upon it, in fact, by its use the clay is thoroughly prepared before reaching the machine, whose only remaining duty is to strike out the brick.

In sanding the molds for use with the machine, a fine sand giving a rich red color is required. Where this is not obtainable, good results can be had by using molding sand, or the dust from the rattler procurable in any foundry. Sieve through any fine sieve, not less than a No. 60.

Tempering clay by a wheel and molding by hand is still followed in many localities. Results from this method al-

though slow, have always proven satisfactory and profitable.

What machine, if any, is best adapted for repress brick? I have seen very excellent brick made on all machines, hence I do not advocate any kind of machine or any special mode of manufacture. The machine is but the agent for putting the gluts into shape; for producing the necessary amount of clay in each. This, I claim, can be done successfully by any of the good machines now upon the market, other conditions being favorable. As to the machine being best adapted to the manipulation of any special clay, is a question to be determined only by actual experience or trial with it.

The repress, although a small machine, plays a no less important part in the production of fine brick than larger and more expensive ones. The press should at all times be kept clean and its working parts oiled. I commend the method in use in some of our yards which requires the pressmen to clean and oil the press thoroughly at the completion of each day's work.

The dies of the press should be frequently dressed or relined and the plungers packed out to fit snugly therein; perfect brick must not be expected from an imperfectly constructed or partly worn out die, as each brick will take on all the imperfections of the press die.

I am frequently asked how much pressure is required to repress a brick. I have never yet attempted to answer this question and will not do so here, but will say, when the edges and corners of the brick are perfectly developed, the end sought by repressing is attained. Multiplied tons of pressure will not do more.

A skilled workman, who can exercise judgment in handling and working the press should operate it. When the press is in operation the die should be wiped off with an oiled rag or brush after each brick is pressed or as often as required to prevent adhesion of the brick to the die. An oil suitable for this purpose is composed of coal-oil one part, and lard-oil three parts, or coal-oil and engine oil in the same proportion, or coal-oil and rancid butter, the latter being warmed and mixed makes an excellent lubricant.

The little paddles by which the brick are removed from the die after pressing must present a smooth and even surface to the brick and should be rubbed off occasionally to remove accumulations of clay or redressed when their surfaces become uneven by wear.

The drying sheds I consider as necessary to the production of good pressed brick as the press and other fixtures. By their use the sun is excluded, the air currents are controlled, and you are better able to produce brick of an even temper throughout, without which good results in repressing are impossible. Bricks dried in the sun or out of doors, dry hastily and unevenly; their inner portions remain soft and mushy while their surfaces are crusty, and their corners and edges dried prematurely, thus

rendering them unfit for the repress. The brick must dry slowly and regularly. This result can be obtained by the drying shed.

The drying shed can be arranged with racks similar to an out door rack for drying. They should be built wide enough apart to allow the trucks and presses to be wheeled between them, and not so high but that the pallets of brick can be removed from the top shelves easily. Boards running lengthwise with the shed can be hinged forming an easy manner of regulating the air currents. A moderate degree of artificial heat can be introduced to advantage.

When the gluts are in proper condition for repressing, they are taken from the racks, picked up carefully one by one, and their faces smoothed over by hand or rubbed lightly with a soft brush. They are then laid on the plunger of the repress and subjected to a uniform and gentle (not over) pressure. After the expulsion from the press die they are carefully picked up by an off-bearer between two thin paddles and replaced again in their position on the racks. Frequently, however, they are hacked one above another until four or five high and allowed to dry in this manner, or again, they are removed on trucks to a drying floor where they are allowed to remain unmolested until ready for the kiln. In any event, it is advisable to handle the brick after pressing as little as possible, until they become dry.

A most significant step in the production of fine front brick is setting. This should be done by competent men who will exercise that judgment and care that the importance of the work demands. Setting, as done by the Royal Brick Co., of Bridgeport, Ohio, is as follows: (I mention this company as one of several with whose manner of working I am familiar and who have been able to attain a great degree of proficiency in their special line).

They use, I believe, an updraft kiln. After the arches are turned the courses are leveled the entire width of the kiln, so much importance do they attach to this that a spirit level is used for the purpose. The brick must be set, not only perfectly level, but plumb. The settling heat therefore, if the burning is uniform, is more likely to bring all down regularly and even, which, to a great extent will prevent sliding, warping, or twisting. The courses do not extend to the walls of the kiln but are separated therefrom by several lengths of common brick.

They commence to set the pressed brick as near above the top of the arches as possible and extend about fifteen or eighteen courses high in a kiln of forty to forty-five high including all. This they think is as many as can be burned profitably.

I would not advocate either the setting of the entire kiln so high or the placing of so large a number of courses of pressed brick therein. In many cases, it would result disastrously, giving an unusual per cent. of salmon or under colored

brick by reason of setting too high on the one hand, or hard or over colored brick by proximity to the arches on the other. This question, however, can only be determined in each case by actual results of burning.

Brick should be thoroughly dry before setting. The courses should be set open at the bottom and closer as they near the top of the kiln and should be burned as quickly as the nature of your clay will permit. These, I believe, are points about which no controversy exists.

A matter of serious concern to the manufacturer and one which sustains a greater relation to profit and loss, to success or failure, is burning. Whatever importance may be attached to this in the production of common brick, it is doubly so in that of pressed and ornamental.

When the brick have arrived at that stage of their production where they are ready to be burned, all labor has been expended upon them. A kiln of brick ready to fire, frequently represents from \$1,200 to \$1,500 invested capital. It matters not what expenditure of money has been made in purchasing the most improved machinery and devices to insure the very highest results in manipulating your clay. It matters not how thoroughly your clay may have been prepared, or how carefully or deftly your brick may have been handled from the machine to the racks, from the racks to the press, from the press to the drying floor and from the drying floor to the kiln, all is lost unless the burning is successful.

Does it not behoove us then to use the most improved systems of burning? Should not the highest skill of the burner's art—for it is an art—be called into requisition?

The kind of fuel required and amount thereof consumed, the time required in burning, etc., are largely questions to be determined by experience and depend upon the chemical properties and peculiarities of your clay and should command your best study and thought. I can find no fixed rules applicable to all cases. The main point in burning pressed brick is, to obtain a uniform color, which can be done only by uniformity of heat and an even combustion in all parts of the kiln. While these conditions should exist in all burns, they are especially essential to the successful production of fine pressed brick.

When opening the kiln remove the common brick down to the top course of the pressed brick, sweep and brush these courses carefully, remove the pressed brick two at a time, toss in pairs, and lay on a spring barrow. Use lath between the layers and load about forty brick to the barrow. Great care must be exercised in handling the brick to prevent chipping and spalling. The faces must not come in contact with the other, or an ugly scratch or mark will be the result.

A dry, roomy and light stock shed should be arranged with ten or twelve stalls or apartments for the various

shades of brick. To this shed the bricks are wheeled where they are taken charge of by the sorter, one whose duty it is to arrange them according to their various shades and colors. A man with clear perception, a keen eye, and excellent judgment should fill this important office. If not graded by an artistic eye according to their delicate shades, they would but present a spotted and unsightly appearance to the beholder when shown in comparison in the walls of a fine building.

This, I believe, completes a description of the machinery, appurtenances, and methods of making and handling successfully repressed brick. I might have entered more largely into details, but these are well known to you all. The points I have suggested are general and will apply to any system and if adhered to, cannot fail to be of value.

In making a brick of fine quality for fronts, few realize the importance of properly preserving the faces of the brick from contamination or abrasion. It is a prevalent but fallacious opinion, that anything will make a pressed brick, that the press will remove the imperfections, square the brick, and make an artistic and beautiful piece of work from an ill shaped glut of clay. Such is not the case. Abrasion, finger marks, paddle marks, etc., once given on the face of the brick cannot be removed by the press, in fact, it is my conviction based upon observation, that the higher finish and beauty that the surfaces of your pressed brick are susceptible of, the more sensitive they are to these defects.

Another point to which I would direct your attention, is the growing disposition to produce large numbers of pressed brick per day. Many of our manufacturers require from 4,000 to 5,000 brick per day to be repressed by two men, using one hand press. Excessive quantities of pressed brick can only be produced at the expense of that more desirable property, "quality."

In Philadelphia, the Mecca of the pressed brick industry, but 1,500 to 1,800 brick are produced per day, each glut being struck out singly and by hand, in a steel or brass mold. While this manner of working seems to the average Westerner somewhat primitive, yet the world-wide reputation and high market value of Philadelphia brick, would indicate that the standard of excellence which they have attained is due to their fine quality, which can only be had by the exercise of great care and patience in their production.

Upon looking over my remarks, I realize they are already of sufficient length. I find that I have omitted all reference to the manufacture of ornamental brick and the great improvements which have been made of recent years for their manufacture, whereby, from one to two thousand elaborate and beautiful designs are made per day, where formerly but as many hundred were produced. Nor have I referred to the advent of the power press, whose coming promises to

revolutionize old and slower methods of pressing brick.

A few years ago the manufacturer who would have proposed to handle by automatic mechanism so delicate a form as a soft brick, would have been voted, putting it mildly, peculiar.

Now we find the power press used in many of our large yards working with almost marvelous results. However, as they, as well as manners and forms of working in connection therewith, are yet subjects of study and development, I will content myself with this brief reference.

An aphorism in vogue among chemists says, "In medicine quality is of first importance." The same may be aptly applied to pressed brick. Quality is of first importance. It is from this they obtain their high market value. Without the time and care necessary to give your pressed brick their well defined lines, their smooth velvety surfaces, their symmetrical proportions, in fact, without a desire to attain the ideal, they are frequently of little more value than common ones and their enhanced worth will not justify the expenditure of time and money necessary for their production.

A story, well known to you all, is told of an old darkey who was called to the bedside of his dying master and informed that he might have any three wishes gratified that he might name. The old fellow was nonplussed, at such a beneficent and unexpected offer, but when pressed for an answer, replied: "Well, Massa, I want first, all the whiskey I can drink. I want second, all the clothes that me and the old woman can wear," and, rather doubting the scope of his first request, said, "Well, Massa, if it make no difference to you, I'll take a little more whiskey." Applying the logic of this story to the subject in hand if asked the prerequisite to the successful production of fine repressed brick, I would say, care, and if you asked the next in importance, I would say, a little more care.

TILE AND BRICK MANUFACTURE COMBINED.

BY J. W. EVERAL.

If the Secretary had asked me to write about what I did not know about tile and brick making I could have prepared quite a lengthy article, but to tell what I know about it will only require a few lines. With fourteen years of experience in clay we have learned a few things; some by dear experience, but withal have succeeded fairly well. My bump of adventure is possibly smaller now than when I was younger in the business. Clays differ so widely in their composition that it is not safe to conclude that your clay will make this or that kind of ware because others are making it. If your clay will make a good brick it is not an unfailing sign it will make a good tile, neither is the rule infallible that clay that will make a good tile will make a good brick. However, I believe, a clay that will make a good tile, if prop-

erly handled, will make a good strong brick. Some clays seem peculiarly adapted to making tile, works free and easy, stands rapid drying without cracking, burns easy without any special care and with but little loss, while other clays are the reverse of all these coveted qualities.

Different clays require different manipulation, some require more pugging than others, some are greatly benefited by weathering, while others are not. The only way to determine what process your clay should be subjected to, to give best results is by actual tests at your own factory. These tests can be made from time to time at a very little cost. A failure to produce good ware or to overcome too great a loss in drying and burning, is seldom due to your *poor* machine. In many cases it is a lack of proper preparation of the clay.

Your clay may require throwing up in the fall and exposing to the action of the frost; this, however, is expensive, where it must be done by hand, and where a large amount of clay is used. Next to this weathering of clays I would recommend a number of soak, or tempering pits, with clay elevator through the center or along side up to mill. Keep from two to four days run of clay ahead, wet it sufficient when put in and thus, by standing three or four days, will become pretty thoroughly tempered and make a better brick or tile. Unevenness in the temper of clay, some too dry and some too wet, with dry lumps mixed in, has a great deal to do with the cracking in drying and burning. The nature of your clay may demand more machinery than simply your tile or brick machine; we think it wise to exhaust the other means at hand that are inexpensive before putting in additional machinery.

If your present machine is too small, or is insufficient in its pugging capacity, or to do the amount of work desired, and you decide to put in a new machine, you have only to let the fact be known and you will soon have an opportunity to purchase without any special effort on your part. The gentlemen that solicits your order first undoubtedly has the best machine, and of course you buy of him. After you have signed the contract for your new machine, I would advise you to take a trip to some adjoining State and remain away until your new machine is put in place and ready for business. You will escape many smiles and frowns from those pleasing gentlemen—machine agents—and save yourself from many a sleepless night, thinking you did not buy the best machine.

Is it practical or advisable to combine brick and tile making? I would say it is, to a certain degree, under certain conditions.

It is far more practical for all tile-makers to be brickmakers also, than for all brickmakers to be tilemakers also. With the addition of a die all tile machines will make brick, but it is not so with all brick machines, therefore with a small outlay every tilemaker can make brick. To what extent he can carry on

the combined business, hinges on two or three things, first the adaptation of his clay for both, second necessary capital, third the market.

We think it advisable for all tile-makers to make and burn, at least what brick they need for kilns, buildings and repairs on the premises, you get a better brick for your purpose, beside saving the hauling, etc.

Now if it is desirable to go a little farther and make a few for home demand, which nearly every small tile-maker has more or less, it can be done at odd times during the season and not interfere with the output of tile. I speak now of small factories of one and two kilns capacity with a limited demand for tile.

But now, gentlemen, when you come to increase the output beyond this on both tile and brick it means business, yes, it means all three things above stated, viz., kind of clay, capital, and market. A careful, cool survey, should be taken of all the requirements necessary to make the increased adventure a success. In considering the first requirement, is your clay adapted to making both tile and brick, quantity and quality considered, clay within easy reach of your works? Second, have you sufficient capital to put in an improved plant, or are your building, kilns, etc., in shape to add to, to make a combined business profitable. Third, your location will have something to do with your market; to have a good location for making tile you want both a good local and shipping trade. Your market for brick depends somewhat on the kind of brick made, however, a home market is always preferable, the price of common building brick will not bear long transportation; freight charges consume the profits. It is some better with street pavers and fine pressed brick; in this you have a wider field, if you have a good article.

In looking the ground over, and having had some little experience in the combined business, and seeing some of the disadvantages incident to the system, for several reasons we do not think it best or advisable. Very nearly all the tile factories built in this State, were built for the express purpose of making and drying tile, and are not at all suitable for drying brick. A very large proportion of these factories are summer factories and dry by natural air, which process is very slow in the average tile dry house. Therefore, buildings that serve the purpose well for making, drying and handling tile, do not answer the purpose for drying and handling brick economically. To make brick successfully and meet your competitor, you must have the facilities for handling your clay and brick with the least amount of labor. If you make a paving brick your tile machine will do it, but if a sand mold brick, or a dry press, or a fine front brick, you want a machine best adapted to the kind of brick wanted. At any rate, if you are known to be in the market for *any kind* of brick you will have use for the brick machine aside from making tile. The

drying of brick, by whatever system you may adopt, should be complete and certain, and should be so arranged as to handle the brick from machine to dry house and so on to kiln with as little labor and expense as the best construction will afford.

The brick business has assumed a different phase in the past few years. Not only has the demand for building brick been increased, but since the discovery that hard burnt brick is the best known material by which to pave our streets and roadways, the demand is one not to be met by any slow process. The primitive way of making brick is fast passing out of favor, since improved machinery has come to our aid for the rapid manufacture. It follows that improved methods must be resorted to in the drying and handling and burning of same. You would hardly think of engaging in the brick business to any extent now without a full equipment and the best facilities for carrying on the business successfully, and be able to compete with your competitor, all this means a vast amount of capital. Neither has it any connection with the making of tile. I mean by this, the plant for making brick is *one*, and the plant for making tile is another. Although they may be separated, only by a partition between the brick and tile machines, using the same power for both but taking the tile one direction and the brick the opposite direction, with this much separation of the business we think that tile and brick making may be combined under one supervision and be operated successfully. Paving brick if wanted at all are generally wanted in large quantities and to do this the ordinary combined outfit is incapable of doing it.

I am aware it is argued that tile and brick making go well together since all tile machines are in some degree brick machines, and, as I have said before, tile and brick making will go well together to a certain extent. A tile manufacturer may be so situated that the demand for tile be limited, he may be able to sell a few and meet a local demand, he also may be so located as to have a demand for brick, and so by combining the two, do fair business.

However, here comes in a drawback in many localities which is hard to overcome, and that is the wire-cut unsanded brick. The end-cut brick is objected to because of a rough end and looks bad if heading courses are laid, the side-cut are better on this account; the end-cut answer well for walks, street paving, foundations, and where the end is not prominently exposed.

I find, too, that common bricklayers do not like to lay a wire-cut brick or one that is not sanded, for the reason that in striking off the mortar and striking the joint they "muss the brick," and the work looks bad. It takes a tidy bricklayer to lay a machine brick unsanded and do a clean job, for this reason common bricklayers work against the use of wire-cut brick.

Now, in conclusion, I would say, if

you have an abundance of good clay, with plenty of capital behind it, with this *broad country* for a market, I know of *no law* that will deny you the privilege of sacrificing your clay and your means, for the good and comfort of the dear people.

CLAYS--THEIR USES AND ADAPTABILITY TO CERTAIN USES.

BY J. F. ELSOM.

IT is with feelings of pride that I respond to your invitation, to address you on this occasion. I am proud to meet a people, mindful of the happiness of living in an age of intellectual achievement, whose masterpieces of accomplishments in science, industry, and commerce, put to shame the extravagant fiction of oriental tales and the wonders ascribed to the gods and heroes of ancient mythology. In the callings and pursuits, of which you are the representatives, the changes produced by recent investigation and discoveries are so vast and so rapid, that it is difficult to follow them or comprehend the power and thoroughness of the transformations in the ordinary clayworking yard of the present day.

The old-time theory that associated clayworking with poverty and illiteracy has gone to keep company with the superstitions of ages past, and America has long since buried all such refuse and intellectual rubbish in caverns deep and wide.

My friends, the application of steam and electricity to the clayworking industries astonish us, by their wide spread influence on the conditions and relations to the arts and sciences. The ease and speed of transforming the humble mud into things of utility and ornament, the uses and applications constantly increasing, are ever putting us in new and unfamiliar situations. We have hardly accustomed our thoughts and habits of manufacture to one new discovery before we are hurried on to another. The clayworking and allied industries have, during the past decade, entered on a new era, the most extraordinary the world has ever seen. The old and imperfect are being cleared away and everything thoroughly reconstructed. The pessimist tells us that ages ago the Chinese were adept in clayworking, and that their industrial skill was superior even, to ours of the present day. I am heartily tired of all this rot. Some people seem to think the moon-eyed, pig-tailed heathen knew everything at one time. I am willing to ascribe to them all the praise their due, but if I were His Royal High Mucky Muchness, of China, I would either cease my reference to the once exalted position or else educate them above a nation of cooks and washermen, at present the sole industries of this people, which we are asked to believe have such a noble and highly developed intellectual ancestry. America is the Grand Temple of Civilization, and I say this as an Englishman:

I love my native land ;

Abuse her as we will :

Pity her starving peasantry as we may ;

Smile at her court pageantry as much as we like ;

Old England is Dear Old England still.

America is built better than England knew; her industrial and intellectual temples are made of the separate stones and pillars of each nation and each age has been commissioned to hew and carve, to mold and burn, to make ready for the demands of this great country. Columbia is collecting the scattered parts and raising this edifice, that leaves the mighty walls and pre-historic castles of the Celestial Empire, but a relic to excite our pity for the wanton ignorance of the Chinese potentate and mandarin.

It is in keeping with the rush of human progress and the important elements that have been added to the demands of increased civilization, that you have sought out many inventions to cheapen the working of your clays and enhance the beauty, and secure the durability of your kilns. I do not wish to underrate these efforts, but as a society of clayworkers we have built better than we knew. We have gone on improving methods and shortening the processes without a thought of the real nature of the material so bountifully supplied, and its adaptability to the demands of the times and then we marvel among ourselves why we fail when others succeed.

It is in the spirit of these sentiments in the short time allotted for this paper, to show the causes of failure; and I shall aim, in justice to myself, to use great plainness of speech. I beg of you to do me the justice to believe that not a word or sentiment shall pass my lips but with the sincerest desire for your benefit, and not for self aggrandizement or hope of future emoluments.

First, then, the nature of the clay. This, indeed, embraces the entire secret, especially with the more modern and approved methods of manufacture, and this understood by every effort of working and moulding, drying and burning, aim to shorten the work, cheapen the product, and add to the durability of the product. This is a truth so obvious that the clayworkers of the country spend thousands of dollars annually to learn more of how their clays are combined. Over two thousand inquiries were answered in my laboratory alone, during the year recently closed, and ten years ago four or five tests were considered a great many for your industry. Then the costs were excessive, now every laboratory of any pretension has a department devoted to the clay industry; and in justice to myself and the profession I represent, Mr. President, I will add, that around these investigations cluster your most sanguine hopes and sweetest promises. The increase of your wealth had its first impetus there, and by every effort of theory and demonstration, of analysis and physical tests, aims to add to your facilities, increases your wealth, and enhances the quality of your wares. This is indeed a truth, so obvious that I

am requested by the honorable gentleman presiding over these deliberations, to speak "in extenso" of the constituents of clay as ordinarily understood.

Taken as a general average, from many analyses of satisfactory clays, we find them to be made up of—

Silica, flinty matter, sand.....	43.5	per ct.
Alumina.....	33.2	" "
Iron oxide, rust, single,		
double, sesquioxide.....	4.1	" "
Carbonate of Lime.....	3.5	" "
Carbonate of magnesia.....	2.4	" "
Extraneous water.....	10.2	" "
Combined water.....	2.1	" "
Chloride of the alkalies..	1.0	" "

Taken in the order in which I presented them, in the foregoing analysis, we find first, silica; this element in its natural or uncombined condition has no chemical reaction whatever, though in all of its chemical relations it preserves the characteristics of an acid, and displaces carbonic acid gas by the aid of heat from the alkalies, hence the cause of your wares melting while burning. When we expel the carbonic acid as directed, a silicate of the alkali is generated, of course the nature of the results of this decomposition depends upon the proportions of the elements constituting the clay. If the alkalies are large the wares will not vitrify, though a vitreous mass will be formed, that will dissolve in water. On the other hand, if the alkalies, especially the chloride, be large in the clay the wares will burn light and be very brittle, hence, for sewer pipe, building or face brick, the less alkali the better. If present in the clay, it must be neutralized. The chemical equivalents of silica is 46.8, its symbol "Si." for short. It is fixed by fire and very infusible when pure.

Second, alumina. This substance has neither taste nor smell, is quite insoluble in water, very infusible though less so than lime or magnesia. One of its distinguishing characteristics is its powerful affinity for water, attracting moisture from the atmosphere with great rapidity. When alumina is once moistened it can not be made thoroughly void of combined water except by exposure to full white heat, and in proportion as it parts with its water its volume diminishes; a valuable hint, Mr. President, for the inventors of specially constructed drying and burning kilns. It is both acid and alkali, as found in clay; usually in the form of an oxide; inasmuch as it unites with alkaline bases, such as potassa, lime baryta, and of an alkali by forming salts with acids, a point worthy the further consideration and investigation of those manufacturers who are troubled with whitewash on their wares, and finely powdered granules found in cells formed in burning glazed ware. Its symbol is "Al," its equivalent, 51.4.

Third, the various oxides of iron; these are generally very feeble bases, though I sometimes find them strong, neutralizing the acids of the clay. Iron of itself has a very strong affinity for oxygen, hence, when present in clay, in very small proportion, will oxidize and color them red,

and when melted in burning imparts a permanent color proportionate in depth to its presence, the sesquioxide being very analogous to alumina in its properties.

Fourth, lime. In crude clay found in the form of carbonates this substance is very abundant in nature, and though sparingly soluble in water, it is readily dissolved by carbonic acid, hence, given the elements which by decomposition produces carbonic acid, one of the principle causes of the melting of brick made from clay with the average constituency, is pushing the process of eliminating combined water, firing, before that of driving off the extraneous water; water-smoking has been thoroughly perfected.

Fifth, the carbonate of magnesia. The crystals forming this substance lose their water of crystallization as low as sixty degrees, then cold water decomposes them, then we have an insoluble white hydrate in powder, with which many of you are too well acquainted, when you see so many cracked brick in the dry kilns.

Sixth, the extraneous water. This is the moisture that has been added to the clay, what we call water unnecessary to crystallization, though some clays will absorb more than others.

Seventh, combined water. This is the water necessary to crystallization called the equation, or primitive volume. The water of crystallization of insomorphous bodies is equal or in some very simple ratio to each other. When a gas like oxygen or hydrogen enters into the combination of a solid compound we cannot compute its equivalent volume as really a part of the compound, though our per centums in laboratory certificates are based on weights taken after the extraneous water has been isolated, hence, from the quantity in the gaseous condition, and the same in its solid form, hence, the reports of chemists show considerable variance, while, in fact, they are really alike, the difference being combined water. When this water has once been eliminated, it can never be replaced, we can make bricks of clay but cannot make clay from bricks.

Eighth, chloride of the alkalies. These are usually very small in the best clays, the less the better, other things being equal, but when some element or elements are in excess the presence of a large proportion is desirable for its neutralizing effects. Sometimes it is necessary to add an alkali to strengthen the clay in some respects.

I have been requested to give an outline of the *modus operandi* of testing and analyzing clay. This point I can touch but briefly and in a general way, inasmuch as it took the last twenty-five years of my life to begin to learn it. I do not know how to do it perfectly yet, and do not think that person lives that possesses this knowledge.

The following suggestions and hints will enable you to classify your clays, the results depending largely upon your chemicals, delicacy of scales, and care in making the determinations. Weigh a

portion of the clay and spread thinly in the platinum dish, place this in a water bath and keep at a temperature of one hundred degrees, C, until by repeated balancing it ceases to lose in weight, generally about two hours, then weigh; the difference in the two weights is the quantity of extraneous water it contains. Now weigh another sample and boil two hours, pour into a beaker slowly and allow to settle until a muddy precipitate begins to fall, then pour off the water, clean by washing out the precipitate, dry on water bath as in the first instance, the difference in weight will be the silica. The water being treated in like manner will give the alumina. Mix one hundred grains of the clay, dried as directed on the water bath, with a pint of doubly distilled water, then add two fluid ounces of C. P. Hydrochloric acid, stir it thoroughly every ten minutes for twelve hours, then cover with a bell glass, and allow to stand for twelve hours; now pour off the clear liquid, and again fill the beaker with pure water as before, stir thoroughly, allow to settle and pour off the clear liquid, continue the process until thoroughly washed, which may be determined by means of litmus test paper, dry on a water bath as before; weigh, the loss is the quantity of lime the clay contained, both the lime and magnesia being included in the foregoing test.

In addition to the foregoing there are many other tests, but these require special appliances and preparations, and should not be undertaken for working results, only by professional chemists, and his results, even, should be accepted as guides, not as dictators by the clay-workers.

Concerning the adaptability of certain clays for specific purposes, but little remains to be said; for even after you have secured the land, and had analyses to show for what purpose the clay is best adapted, there are so many contingencies and exigencies, such as digging, ageing, tempering, pugging, pulverizing, kneading, grinding, molding, drying, and firing, so many different appliances for manipulating that change the mechanical condition of clays, that no cast-iron rule can be laid down, but, given the treatment to which proposed to subject the analyst and physicist can readily determine these points. When a material is expected to withstand pressure, either external or internal, such as sewer pipe, facing brick, corner blocks, and the like, the clay should be rich in alumina and poor in lime, magnesia, and the like. When subjected to abrasion like pavers, floors, and the like, should be rich in silica and those substances easy to vitrify, and when we wish goods to withstand heat, like fire brick, the silica should be three times the alumina or thereabouts. The less lime, magnesia and iron, the better. With reference to table ware and kindred glazed goods, this industry is really separate from yours, and of itself of sufficient importance for class conventions, a number of which I have had the pleasure of addressing, hence will not

refer to in this connection. You must remember that mechanical changes may be the cause of certain chemical changes, hence, your clays are susceptible to changes as you gain in experience, for, as we have been told repeatedly, experience is the best of teachers, but often demands fearful pay for services.

Changes, however, are the order of the day. Yes, Mr. President, material changes are constantly taking place all around us. Vegetation flourishes for a brief period and decays. Robust manhood follows youth and it is quickly changed for the hairs and wrinkled visage of old age. But science is unchangeable, the same laws govern matter that governed it thousands of years ago. In the business you follow, gentlemen, you perceive that certain causes produce certain effects. Sometimes our neighbor discovers a new method, a shorter process, and by repeated trials and investigations, is enabled to discover a new rule of action, and determines a law governing the working of clay. Philosophy is enriched by development, and these conventions record the glorious achievement. These conventions, Mr. President, and gentlemen, are makers of history, and prominent among the discoverers of science are the names of those who have improved clayworking processes, and produced new material from the humble clay, and new votaries will ever honor them for what they have done. And, suppose you that the last victory has been won—the utmost limit of the pinnacle of success reached? No. My friends, science and mechanical achievement have but begun their march. Genius is yet but a dreuling infant, tottering in childhood's rambles. The most splendid triumphs are yet to come; at what time I know not. What new discoveries will be made in the science of brickmaking and clayworking, I know not. Into what new fields of conquest and of glory are to be shown, none can tell. The voice to all is, to rally around the standard and go forward to aid in the victory and share in the honor of achievement. None shall be excluded, let all come, and make of this society the best, the greatest, and the finest of them all.

ARTIFICIAL DRYERS AND PRELIMINARY CLAY TESTS.

BY F. E. FREY.

This subject has been brought up at every session of our Convention so far, and the fact became potent, that none were yet perfectly satisfied with the appliances in use up to the time of our last Convention.

We are all looking for something better, and the brick and tilemaking fraternities are looking for something that will do the work rapidly, safely and economically.

The question is: How shall a perfect dryer be constructed? I dare say that all of you are not expectant to have me describe such a device, but alas, I

fear that I may disappoint you in that, somewhat.

The design of this paper is not so much to indorse certain constructions, as to analyze the past attempts, and to point out seeming advantages of some, which experience has taught to be effective.

We all know that some varieties of clays are not suited for rapid drying, while others will stand forcing to any extent.

Having had charge of the clay testing department for the firm with which I had so long been identified, the opportunity was offered me to watch these peculiarities, and note the requirements that clays of certain varieties and composition demand.

It is a well known fact, that some clays when made into brick or tile have to be dried slowly at first, so as to convey a uniform heat all through them. This often dare not be over 80 or 90 degrees, otherwise the outside will dry and contract, while the inside remains the full size as when made. Unfortunately these clays have not the properties of india rubber, so as to adapt themselves to this inequality in size of the component parts, and the result is, cracked brick or tile.

In fact, a great part of the clays we have, act in this way. Some, however, will stand very rough treatment, allowing one side to dry, contract, and draw the brick crooked over an eighth of an inch, when dried, by side currents of air, or by the sun, and then draw straight again without any seeming harm to the structure. Such clays can be dried very fast. While some clays can be dried very quickly from the initial point, others can only be forced after they have been nursed along until partially dried. Again, some varieties need slow drying during the whole process.

We learn from this, that our artificial dryers necessarily must be adapted to follow the needs of the peculiarities of the different clays.

First, when clays require slow drying at first, that the dryer is so constructed as to give a low, uniform heat with gentle circulation.

Second, that where the clays are of that kind which can be dried fast, after a certain stage, that additional heat and circulation can be allowed.

Third, clays that will dry safely only when the process is slow the whole way through, necessitates large dryers, low heat and gentle circulation.

Fourth, where clays are of such a nature as to stand fast drying that high heat and good circulation can be obtained, and the work forced rapidly.

We have several agents from whence we derive heat for these purposes.

First, and also foremost, is natural gas.

Second, crude oil.

Third, exhaust steam.

Fourth, live steam.

Fifth, wood and coal.

The question is: How shall we utilize these to the best advantage?

Invention has constructed and stud-

ied many different devices, and has in some instances, shown some very good results. Yet the art, in this particular does not receive the benefit from invention, to utilize the heat units economically any more than does the steam engine where only a small portion of the heat is utilized for actual labor, while the balance is lost. However, we can say, that the artificial brick drying is now further advanced in the economy of fuel, after only a comparative few years of experiments, then the steam engine of over a hundred years of practical existence.

The first dryers constructed, were naturally, heat applied direct by combustion of fuel under a floor, heated thereby. These have now various modifications, and the advantage of allowing the forcing of the process.

Next, heated floors, by blowing steam under plates of iron, stone, or baked clay. So, also, have these their modifications. Steam is used from the engine while running, and from the boiler when at rest.

This plan seems to present a form of saving the heat of the escaped steam during working hours, and the absence of danger from excessive heat. The contraction and expansion of the floor plates may endanger the durability.

Those seen by the writer have been in use but a few months, but seemingly appeared to be in good condition. Many of these are said to be in use in Great Britain.

Third, steam pipes under lathed floors, where several floors above each other give great capacity under a small area of roof, and good circulation. For these, both live and escape steam are used.

Fourth, steam pipes for escape and live steam under an open floor made of lath, on which the brick are haked.

Fifth, steam pipes under floors provided with tracks, whereon cars loaded with brick, either on pallets or haked direct, are shoved, and remain until dry. The dryers being arranged generally, that the pipes and tracks incline, so that the cars come in at one end with the green brick and the dried brick go out of the other end of the dryer. This class has many modifications and can be arranged very easily, to comply with the different requirements of the clays. Some of these are arranged with pipes in coils, only part of the way under the floor. The cold air coming in at one end of the coils, and is distributed so as to become heated, and is then drawn horizontally across the balance of the dryer, and ejected by means of flues and exhaust fans.

Another form has the pipes under the whole floor in great profusion. Air is admitted by valves under the whole floor, which, when heated, passes through the loaded cars of brick, and is drawn, either by a large ventilator through a perforated floor above the cars, or suction fans through tubes distributed below the roof.

All these devices have their advocates and running advantages, and it is for you brick manufacturers to glean that

which is good and worthy of adoption, and reject that which experience has taught you to be worthless or second best.

We must have dryers that we can depend on to dry our brick as fast as they are made from day to day.

Those fortunate enough to have material that will dry in twenty-four hours, or less, want a dryer of such a construction. The others less fortunate, whose clays require forty-eight hours or more, to produce good brick, must necessarily have larger dryers, in production, and so arranged as to favor the tender treatment the clay exacts from them.

Having enumerated the various devices of dryers we have knowledge of, let us now look over the category and see if we can in this short paper, give sufficient hints, so that we can discuss the pro and con thereof.

First, the tunnel dryer, with flues under each tunnel, for coal, wood, gas, or oil.

This is said to be a rapid dryer, which can be gauged by the regulation of the fuel to suit any clay. The cars with the green brick enter the end farthest from the fire—where the least heat is, and are finished drying, with the greatest heat, hence have a gradual increase of heat during the whole process.

To counterbalance these advantages, the following is urged against them:

First, it takes fuel from the beginning to the end.

Second, it takes stokers continually, and wages in consequence.

Third, it is costly to build.

Fourth, where wooden pallets are used, or wood of any kind is used in construction, danger from fire.

Analogous to this tunnel dryer is the so-called "hot floor," without partition walls for tunnels, or tracks for floor cars, but having similar flues for fuel under the floor. The ware is placed direct on the floor, and dried rapidly. This is used for fire clays mostly, which stands, without injury, great heat in drying.

The same arrangement holds good in this, as to economy in producing the heat, but as no wood is used in the construction, there is little danger from fire.

This also costs less, as no division walls for tunnels or tracks are needed.

The extra handling of the brick, versus cars, is said to be 5 per cent., also fuel and firemen.

The hot floor for steam, made of metal plates, sand stone, or baked clay plates laid in cement, on series of walls, about a foot above the ground. This is said to dry brick in less than twelve hours. First cost is some more than the hot floor with fire flues. Will dry tender clays safer than the hot floors. Costs nothing to heat it while the engine is running. There is no back pressure to the engine. No danger from fire. Costs, for live steam at night, also for handling brick. The plates may become loose from expansion and contraction. This point should be investigated.

Steam pipes under first floor made of lath, with several floors above each other. These require a building of several stor-

ies, and elevators. First cost equal to a car steam dryer, excepting tracks on first floor. Cost of elevators. The several floors are inexpensive. Excellent for tender clays.

The time consumed for man and loaded truck to ascend and descend is about eight seconds to a story. This has large capacity with small roof area and good ventilation, owing to the height of building. The heat from the kilns and radiation from boilers, can be drawn in to assist. Uses escape steam during the day and live steam at night. Cost of handling brick a little more than from simple floor, probably about 7 per cent. over car drying.

Steam pipes for exhaust steam during the day, and live steam at night, under a lath floor.

The brick are hacked upon this floor, and consequently, do not dry as fast as when set direct on the lathed floor. Circulation is obtained by ventilation, draft flues, or fan. Cost of handling the brick about the same as from a floor. Good for tender clays.

CAR DRYERS.

Of these we will analyze two distinct constructions, which were enumerated before.

First, the steam pipe in coils in one section of the dryer, where the air is heated and drawn horizontally across and past the cars, and discharged through the vertical flues at one end. Said to dry rapidly. First cost expensive, owing to the number of cars, tracks and pipes. Costs less to handle the brick than by the heretofore described systems. No cost during the day, excepting slight back pressure of the engine which is the same for all those where exhaust steam is used, excepting the slatted floor. Will dry tender clays if used properly. Disadvantages claimed are, that steam coils are upon each other, and if leaks occur below, it is troublesome to mend them.

Second, on horizontal draft the opening of a door lets the cold air in, and cools off a large portion.

The second construction, with vertical draft, steam pipes under the whole floor costs for pipe, tracks, and cars, about the same as last named.

The heat is drawn vertically through the loaded cars of brick. Will dry tender clays. Advantages claimed are, opening of doors effect only a small area. The pipes are accessible all round, and circulation can be obtained, either by flues, fans or attaching to high stack of engine or kilns.

Another point of economy in these heaters, where steam is used in coils, is, that the water obtained from the condensed steam is of the purest quality for the boiler, and is already heated, if stored in an underground cistern for the boilers. The back pressure on the engine for a well constructed steam coil, should not be over one or two pounds to the inch. The cost of this is not perceptible in the consumption of the fuel. Inasmuch as watchmen, or burners, are at

the works during the night, the cost of heating the boilers for live steam for the dryer is confined to the fuel alone.

It is claimed, however, that it is more costly to fill the kilns from cars to dryer, especially where pallets are used, than it is with a wheelbarrow.

This is another point which should be elucidated at this meeting, inasmuch as there is a diversity of opinion regarding this point.

The question may now be asked, what kind of construction, the writer considers best after his investigations. This I will answer by describing such a one as I deem the nearest correct and suited to the various clays.

A car dryer for stiff clay brick with two or three platforms or a shelf car for a soft clay brick on pallets, to hold about 500 brick.

The dryer made in compartments of three or four tracks from 80 to 120 feet long.

An escape steam coil to start from 15 to 20 feet from the entrance end. One live steam coil to cover about two-thirds of the area under the escape steam coil and one-third the way, a third steam coil for live steam under the third to give the greatest heat at the discharge end of the dryer. The live steam coils connected by straps to the boiler, so as to carry all the condensed steam as water back to the boiler. The water from the escape coil can be conducted into a cistern and pumped into the boiler or used as warm water to moisten the clay. Where the escape steam is used more than one-half of the fuel is saved.

The air is admitted under the floor at or near the end of the dryer and a vertical flue takes the moist air out at the other end.

The usual transfer tracks are at each end and a door for each car track.

This covers a portion of my observations, and, since writing the above, I saw one of the steam heated floors of boiler iron riveted together steam tight for a large area, which was used for fire brick and was said to work excellent. I had hoped to say something in this paper in regard to the testing of clays also, which subject is of great interest to me, having had charge of this branch, where I formerly was connected, and which I shall give further attention, but find this paper getting too long, will therefore defer it to some future occasion.

OHIO TILE, BRICK AND DRAINAGE ASSOCIATION.

Proceedings of the Twelfth Annual Meeting.

The Convention was held in the A. O. H. Hall, Columbus, Ohio, and was called to order Wednesday, February 25th, 1891, at 10 a. m., by Mr. J. W. Everal, of Wcs-terville, Ohio, the president being absent.

The attendance was large, there being nearly one hundred present and an unusual interest was manifested by the close attention paid to the papers and discussions by all the delegates, few if any of whom, missed a single session.

After roll call, the reports of the members on the work of the year were heard, which, as a whole, were very encouraging.

Mr. Horlocker, of Columbus, O., then read an interesting paper, entitled, "Gleanings from Ten Years' Experience in Making Drain Tile," after which the Convention adjourned till 2 p. m.

SECOND SESSION.

The meeting was called to order Wednesday afternoon with President Eudaly in the chair.

Mr. Geo. S. Tiffany, Tecumseh, Mich., was introduced and read a very instructive paper on "Brickyard Construction." We were unable to obtain a copy at the time but will probably be able to give it in full in a subsequent issue.

Pres. Eudaly—I think, perhaps, we might give the subject of belting and shafting some attention, as it is one that interests every man present.

Mr. Powell—I don't see how anyone could add to Mr. Tiffany's paper. We are advised in the first place to get good machinery, and to get good belting, and to get a good engine, and to get a good boiler, and I don't see that anything can be added to that.

Pres. Eudaly—I know that three or four gentlemen can give us some interesting points about belting, speed, line shaft, etc.

Mr. Everal—The line shaft to our engine runs at about 140 revolutions per minute. Our piston travels about 90. The pulley on the engine shaft running the line shaft is, I believe, 18 inches, and the pulley on the line shaft 2 feet, 4 inches. There has been a question in my mind about whether it would be proper to run our engine at a higher speed than 140 revolutions. I should like to do it if the engine will bear it. It is 9 x 18, I believe. We would like to increase the speed of our mill. Of course we have a belt direct from the engine to the mill, and another belt from the engine shaft to the line shaft, and it has been a question in my mind whether it would be advisable to increase the speed of our engine higher than 140, whether the wear would be greater, or whether we would gain or lose in increasing speed. We have a 20 horse power engine and it taxes it to its full capacity to run the machinery we are now running, and whether or not we would get more power out of it by increasing the speed. Our line shaft runs the other machinery at a good rate of speed. I would like to have Mr. Tiffany's opinion of the speed of the engine.

Mr. Oakes—I would say according to Mr. Everal's statement that his driving pulleys are too small in diameter. Mr. Tiffany's suggestions suit my experience. We started out with small pulleys in diameter and burned our place. Would say that our cylinder is 11 inches in diameter.

Mr. Tiffany—Mr. Everal's speed is 420 per minute. That is not high. If his engine is well made he can increase it

to 500. I mean by speed so many feet a minute, not revolutions. It is three feet to each revolution. It would be one-third of 500. Mr. Everal should increase the driving pulley on line shaft to keep the motion the same. He would simply gain more advantage with his engine—he would get one-fifth more power.

Mr. Everal—If we increase the size of the pulley, which drives the mill it takes more power to run the mill than if we had a smaller pulley on the engine shaft.

Mr. Tiffany—You would increase the pulleys on your line shaft.

Mr. Everal—We belt directly from the engine shaft to the mill. We run the mill direct from the engine shaft.

Mr. Tiffany—The engine in the works I have charge of has a speed of 552 a minute. We did not stop it but once in a three month's run.

C. W. Raymond—. I believe he can safely speed his engine from 140 to 200 a minute, especially if it is a sound, well built engine. I know manufacturers are putting an engine on the market at the estimate horse power of 60, and then depend on speeding it up to 80, 90, and sometimes 150.

Mr. Darnell—We have a Stevens engine. After the catalogue was out they got their engine and they rated it at 55 horse power. Ours runs 160, we drive a 34 inch pulley on the shaft. I thought the rating was pretty high, myself.

Mr. Tiffany—The first rating was about the same. 10 x 16 at 50 or from 50 to 60.

M. Horlocker—I would ask if I heard right—that Mr. Tiffany advises the running of machine directly from line shaft. I would like to ask that in case of oil, it would not be more advisable to run the machinery, mill and line shaft with separate belts from the engine. Run the line shaft from the pulley on one side of the engine and the mill from the other.

Mr. Tiffany—It depends on the size of the plant. If you only had a brick plant you need not have any line shaft. Take a plant where they have two dry presses, pug mill, elevator, and brick machines, instead of putting line shaft over the dry pan, I would even run the dry pan with independent belts, so you could start or stop every one in a minute. If you put your line shaft over that you have all the power of your engine exactly on that line shaft.

Pres. Eudaly—The next number on the programme is "SOME NOTES ON DRY PRESS BRICK MANUFACTURE," by W. D. Richardson, North Baltimore, Ohio.

Mr. Richardson, (Bringing out an immense satchel,)—Gentlemen of the Convention, I have never been placed in just this position before.

Pres. Eudaly—Neither have I. [Laughter.]

Mr. Richardson—Generally when I get ready to speak I see Mr. Eudaly sitting near to say "Sit down, I want to talk." [Laughter.] Now he has to sit there and listen to me. It pleases me very much. It is all so new and differ-

ent. While talking on dry press brick I wanted to be sure that all would know what dry press brick are, and therefore, I brought with me a few pieces I chipped off some brick. You will observe that some of them are vitrified.

Mr. Richardson then read his paper which is given in full on page 305.

DISCUSSION.

Pres. Eudaly—Gentlemen, we have listened to an exceedingly interesting paper. We would like to hear from some of you on same.

Mr. Postle—Mr. Chairman, before we go any farther, I think we ought to tender Mr. Tiffany and Mr. Richardson the thanks of this Convention for their very able papers and request that they be published.

Motion put and carried.

Pres. Eudaly—I may as well state here that this morning a few of us got together after we had worn ourselves out trying to find where this Convention was to be held, and determined that if we did find the Convention anywhere that we would have a stenographer take a full report of the proceedings, but I see the CLAY-WORKER's stenographer with us therefore will have a full report and the papers will all be given.

J. B. Powell—Mr. President, I want to say a word about dry press brick. I was in a dry press yard a few days ago, and asked the burner how long it took them to burn. He asked me what I meant. I said "how long does it take you to water smoke?" He said, "About seven days and then three days to burn the kiln." If we want good results we do that. If we do it in less time than that our bricks are a good many of them no account." I thought that as far as economy was concerned that there was not much saving in that way of burning brick.

Mr. F. E. Frey—One item I took notice of, the gentleman said he thought he could make dry press brick out of clays that could not be made any other way. I think if any clay can be made into a brick, it can be made by the soft mud process.

Mr. La Tourrette was called for but asked to be excused, saying, "I have retired from the brickmaking and machine business entirely and you must excuse me from making any remarks on this occasion. I think, though, I can speak better of the class of men here to-day than those who attended the conventions some years ago. I think we have a very fine class of men with us to-day. This clay business has been a wonderful benefit to us and to our country, and I am glad to see such a large and creditable gathering.

Mr. C. W. Raymond—I would like to reply to a certain extent to Prof. Richardson's remarks. It seems very strange to me when there is so much capital seeking investment, that with the very best and latest methods of putting paving brick on the market some of them have not hit upon the dry brick process. Why, I can refer you to this city (Co-

lumbus) where, I am creditably informed, there are 16 miles of streets paved with brick made by the plastic process, equal, I may say, to granite. Then, there is Nelsonville, Middleport, North Carolina, West Virginia, Galesburg—in fact any of the leading clay centers of our country where they are now working successfully a moderate grade of clay. It seems very strange to me that some of these large companies seeking investments have not hit upon the dry press process.

Mr. Tiffany—I saw a dry press machine working on the Ohio river in 1857 and finer brick I never saw made anywhere, but they did not succeed in burning them, and I think I would be justified in saying that that is the great problem in the manufacture of dry press brick. I made drawing upon drawing of dry press brick machines, and I could show them to you to-day. My theory was this, you would have to take the watersmoke off the brick. That if you could make the brick without this water, the annealing process could begin almost at once. I held to that idea for a long time, and a friend of mine who had visited St. Louis, and other large cities said to me, "Tiffany, I have seen a dry press brick machine work, and it works splendidly, it makes fine brick; but it takes them two weeks to get the clay warm. I think it ought to get warm in half that time with another process." Mr. Richardson alluded to the remarks I made at the National Convention. A gentleman from Grape Creek, Ill., spoke very favorably about the dry press brick machine. He said—"Gentlemen, I believe it to be the brick machine of the future." Now, if I have any one object in this Convention work it is to prevent my brothers from going into wild expenses. We ought to go prudently in this matter. Make your calculations with a certainty. I have seen men ruined time and again by foolish experiments. And yet I would not say a word against the dry press process. I want the whole truth, gentlemen, not half the truth. I would not object to any man getting up and giving the whole process from beginning to end.

W. D. Richardson—I would like to ask at what temperature the water of crystallization begins to leave the brick.

Prof. Elsom—After the brick have been subjected to 212° Fahr., 12 hours the combined water is all gone. Our rule is to slowly remove the extraneous water until at a degree of 212° Fahr. when the water of crystallization begins to leave. Now, just to the extent you remove that water you have altered the chemical composition of your clay.

Mr. Richardson—This is the point I wanted to bring out—that we are more or less familiar with the fact there are two waters in the clay that can be of no practical value. In the laboratory you can drive off the combined water in 12 hours, when kept at a temperature of 212° the water will be gone. In the burning of dry press brick, where the combined water is closely compressed it takes us two weeks to watersmoke, but

what we are after is this, if we hurry the watersmoke off we drive it off too fast and the brick are checked. In the laboratory you can drive it off as fast as you wish. I presume if I were to state here the length of time we spend in watersmoking some of you would be as much surprised as Mr. Tiffany was. We generally spend from eight to ten days in watersmoking from the time we put the fire under the kiln. We have treated our clays long enough to know just what they will stand. We measure the temperature exactly. We know just what degree of heat we have in our kilns all the while. These facts would not be of any use in burning different clays.

Mr. Powell—I would ask the gentleman—that if it takes so long to watersmoke dry press brick, if it would not be cheaper to dry them by some other process before they are put in the kiln—if he would not get better results?

Mr. Gunsallus, Plymouth, O.—I have never had any experience in the manufacture of dry press brick, but I have had a little experience in brickmaking. I was at Marietta, Ohio, this fall and saw a man by the name of Thisler. If he is here I would like to hear from him. This man made brick by hand, and he bought one of these dry press brick machines and put up a kiln of brick. I happened to go there and I stopped at the hotel, and there was a brick lying on the window in the office and a U. S. civil engineer brought it to me and said, "There is something that is new—there is a brick made on the machine right from the bank, and there was nearly 12 inches of snow. They wheeled the clay right in from the bank to the machine and in 15 minutes they were in the kiln and had fire under them." I said, "I will go a hundred miles to see that done." He said, "I will show it to you." We went to see this kiln and saw this Mr. Thisler. He had his kiln opened then and another kiln had been fired just two weeks that day. I don't believe you could find a sound brick in that kiln. I do not think there was one brick in the kiln that was not cracked. It was done by watersmoking. The gentleman that sold the machine that was there said, "You have watersmoked those brick too fast—you ought to have watersmoked them three weeks." Like Mr. Tiffany, I was terribly in favor of dry press brick machines. I wished to build one, but I have been over the country a great deal, but I have found a great deal of trouble in burning. Is there a civil engineer in the house?

Pres. Eudaly—You had better find out before you say anything about them. [Laughter].

Mr. Gunsallus—I would like to know more about burning brick. I have talked with a great many civil engineers and they invariably ask how much water a dry press brick will absorb. If you can keep it from absorbing the water after it is burned, it will make a good paving brick. Look into the matter very carefully before you go into it very far. I would be very much in favor of dry press

brick for paving if you could make a perfect brick.

Pres. Eudaly—We will hear now the next paper on the programme, which is a paper on "Pressed and Ornamental Brick," by C. W. Raymond, of Dayton, O.

Mr. Raymond then read his paper, which is given in full on page 307.

On motion of Mr. Everal a vote of thanks was tendered Mr. Raymond for his able paper.

Pres. Eudaly—Gentlemen, Mr. Raymond's paper is now open for discussion. Do not be backward about this. He certainly has gone to a great deal of trouble to prepare it for us.

Mr. Neff—How high do you set the press brick one above the other before you cross them?

Mr. Raymond—Two high; one above the other and then cross.

Mr. Neff—I have seen them set 3 or 4 high and then crossed.

Mr. Raymond—I was just going to call upon Mr. Townsend. I don't know any one more capable of giving us reliable information.

Mr. Townsend—I am not a member of the Association, but I would be willing to answer almost any question. In regard to pressed brick—we set two high. Ornamental brick we set perhaps four or five high, owing to the kind of ornamental brick, those standard ornamental brick we set 5 high.

Mr. Richardson—I would like to ask if he has any trouble with his brick becoming discolored, and how he overcomes it.

Mr. Townsend—Our experience advises us about what to guard against. We place them in different parts of the kiln.

Mr. Raymond—I would like to ask Mr. Townsend how many courses of pressed brick he sets in a kiln, and how many courses high is the kiln over all.

Mr. Townsend—About 40 courses altogether, about 15 or 18 of pressed brick. We bench perhaps two or three courses of common brick under the pressed brick.

Mr. Tiffany—I know in Philadelphia after they press the brick they put them in little columns, one above the other. Then they take them and put them in two columns of five, six and ten courses. Now, it strikes me this is a point for the dry press brick men. I am somewhat familiar with the process in Philadelphia and they set them ten courses high in the kiln. I think at Findlay they set them over 4 courses high.

Mr. Richardson—Courses of four and sometimes three and two.

Mr. Griswold—Better two.

Mr. Richardson—I did not come here to advocate the dry press process or to induce anyone to undertake to make brick by this process. Mr. Tiffany does not like to advise men in moderate circumstances to enter the dry press process as it requires a great deal of capital. While, by the old process with a few hundred dollars you could do quite a business, and that will, also, be one reason why the dry press business will not become popular—because of the capital

required. The question in my mind is this: Is not the time coming when the pressed and ornamental brick are going to be made by the dry press process, for the reason that where you have the capital you can make so much cheaper, and you know the tendency in manufacturing to-day is the massing of large amounts of capital together so that smaller establishments cannot compete with them?

Mr. S. E. Hagy—There, that is one feature about the argument that pleased me—that it requires \$50,000 to \$100,000 to continue the business. That makes me feel that we are not going to be crowded out very soon. I want to refer you to a little experience in regard to the dry press process. Thirty-five or thirty-six years ago I was a laborer in this town hauling brick. Mr. Atchison and a few men I could name, had a contract to furnish 60,000 brick and they burned two or three kilns of them. I happened to be one of the parties to haul those brick, and we could unload them better with a scoop shovel than anything else. Hope this is not the case all the time. I believe that there is certain clays in St. Louis and other places where they make them successfully, but I believe in this part of the country it will not be accomplished very soon.

W. B. McClure—I would like to ask Mr. Raymond if pressed brick can be burned successfully in down-draft kilns.

Mr. Raymond—Yes sir. I have seen a great number of down-draft kilns burning pressed brick successfully.

S. E. Hagy—I would like to ask Mr. Raymond how high he would set them in a down-draft kiln. Would you set them like you do in the up-draft?

Mr. Raymond—I should judge, in a down-draft kiln the manner of setting would be reversed and set wider at the top and closer at the bottom. I would like to have Mr. Eudaly give us his views.

[Cries for Eudaly].

Pres. Eudaly—I don't know whether it is just the thing for me to talk here, but when I have said enough somebody head me off. You are talking of setting pressed brick now and not common brick. Pressed brick are made, gentlemen, to make fine looking buildings. They will not last any longer in a building than a common brick. They are simply used to beautify the building, or where a certain shade is desired. They must be set in the kiln so as to prevent melting and flushing. They must, also, be set so as to have all of the brick burned. These are two things required in a pressed brick that are also hard to accomplish with the same setting. You can burn the brick more uniformly hard in a down-draft kiln by setting them open at the top. In an up-draft kiln you will be more apt to get a greater number of hard brick by setting them open at the bottom. You get a larger per cent. of purely hard brick by burning in an up-draft kiln, especially where you are burning pressed brick. In a

down-draft kiln if you should set them loose at the top and have too strong a draft you would fail in burning the bricks. I think there are more men deceived about draft than anything else. Now if you set a down-draft kiln with the brick open on top you will either flush or mark a large per cent. The down-draft kiln will receive a very safe heat at the top before they are warm at the bottom. If not very careful they will fall apart and send the heat down and will spoil the brick. It is very difficult to prevent that.

QUESTION BOX.

First Question—"What is the length of time required to burn with gas?"

Mr. N. Whisler—Are you wanting to know about burning brick with gas or brick and tile? I am using gas—have been using it for three years, and as far as my experience goes, I find that I burn in just about the same length of time that I did with wood. I can make just as good a burn with gas as I did with wood. This is my experience in burning with gas.

Mr. Wagoner, Covington, Ohio.—I don't want that idea to go abroad that there is no difference between the two. It depends a great deal upon the pressure. I find if I have plenty of pressure I can burn a kiln of tile in much less time than I can in any way I can invent with wood, because I can put the fuel in the kiln just where it is wanted.

Second Question—Does the kind of fuel make any difference in the quality of brick or tile?

Mr. Whisler—I have never used coal myself, I have used wood and natural gas and can tell no difference and I venture to say I can take a brick burned by gas and one by wood and I don't believe there is a brick or tile man who can tell which is which.

Third Question—"Will a large drive pulley reduce the power of the engine?"

Pres. Eudaly—I suppose it is understood that the pulley and line shaft remain the same. We will take it that way.

Mr. Frey—It will diminish, of course.

Mr. Tiffany—The power of the engine is the same. It has more looseness to overcome.

Mr. Everal—The leverage is greater.

Mr. Neff—I asked that question. It seemed to do that in our case. We used to run our machine with a 15 horse power engine and we put in a 30 horse power. It don't much more than run the machinery. I think it is more in the motion than anything else. I did not know but the size of the pulley had something to do with it.

Mr. Tiffany—You claim you had a 15 horse power engine and now you have 30 horse power. It ought to run twice the power that might be applied.

Mr. Neff—We used to run very fast motion with the small engine. Now we run very slow.

On motion, the meeting adjourned till 7:30 p. m.

THIRD SESSION.

The meeting was called to order Wednesday evening at 7:30 o'clock by Pres. Eudaly.

Pres. Eudaly—The first number on the programme this evening is a paper by Mr. Elsom, entitled, "Clays, Their Nature and Adaptability to Certain Uses."

Prof. Elsom read his paper. (See page 310.)

Pres. Eudaly—No paper has ever been read before this Convention at any time that contains matter of so much importance to many of us. The paper is now open for discussion.

Mr. Simpson—There is nothing in this brickmaking business that interests me more than the composition of clays. I have studied bricks ever since I began brickmaking some years ago. There is one or two things about this not quite clear to me. The Milwaukee clay has an extraordinary amount of iron and yet we all know it makes a cream color brick. Every brickmaker will tell you that the color depends upon the iron in the clay, if I am correctly informed on that, and my authority is the city geologist of Milwaukee who claims that there are alkalies in the clay that neutralizes the effect of the iron. Now, if there are alkalies in the clay sufficient to do that I imagine it would effect the quality of the brick.

Prof. Elsom—The State Geologist of Wisconsin is right and he is wrong, and I know whereof I speak. The iron is not a neutralizer of the alkali but is taken up by the alkali and is of itself neutralized. Its coloring properties are eliminated and the constituents of the clays that are desirable for brick remain intact. I have a sample of clay that Mr. Frey sent me with but little alkali. And we burned the clay, and you must remember that these elements some of them are more fusible than others, and sometimes two elements melting will take up another element and form a fourth. There is a secret about this that clayworkers don't understand.

Mr. Billingsly—Are there two forms of iron. One which gives color and the other does not?

Prof. Elsom—Yes; there are two forms of iron.

Mr. Frey—Will you please tell us which of these constituent parts of clay you consider will combine and as flux melt together and vitrify—iron, soda, potash, aluminum.

Prof. Elsom—Chloride of alkali in various shapes.

Mr. Frey—Now, does these fluxes combine with the silica or aluminum?

Prof. Elsom—The silica. The aluminum will not combine in that way. But it will combine and make a something that will look and act like silica, but not vitrify.

Mr. Frey—Another question. I find in some analysis that a certain proportion of tannic acid. Is that dangerous?

Prof. Elsom—No, sir. I would be a little afraid of that if the fire burned into the brick. Where you burn coal I would not be afraid to use it.

Richard Wallace—How would you neutralize lime?

Prof. Elsom—You could not neutralize the effects of lime after burning. The only way to neutralize lime is at the start. Now, there is a wide difference between neutralizing cause and effect. If I had a clay containing too much lime, I would get a clay that had an abundance of silica and you could flux out your lime easily that way. It would make a good brick. It would bother you some about making a fine face brick and would not whitewash. Some of you people are situated so you can not get sand. Now I am paying for manganese only \$11 a ton and a ton of manganese would last an ordinary yard for a summer and then you will neutralize the lime. It is merely used as you would sand, dust a little over your brick.

Mr. Frey—Will manganese burn red in color?

Prof. Elsom—What temperature would you ordinarily apply?

Mr. Frey—I don't know.

Prof. Elsom—It will have a tendency to burn brown. I won't give you these as positive, accurate figures, but I think at about 100 it will burn a yellow, at 200 blue, at 300 red, and at 400 black. At about 3,000 it will burn a pretty dark brown.

C. W. Raymond—A great drawback to manufacturers of brick, especially in the Northern States, is the presence of limestone that they find it almost impossible to get rid of, and the fact of it is some of them don't try to get rid of it, and it is detrimental in many ways to making brick successfully and the color is very bad. Now, they perhaps go on working these limestones up by pulverizing them. In an event of this kind can they neutralize the effects of it by manganese?

Prof. Elsom—Yes, sir. To neutralize limestone is much easier and cheaper than to neutralize lime as you originally find it in the clay. The lime comes in your brick as an extraneous matter, it does not hurt the brick.

F. M. Gardner—My tile, two-thirds of them, are a nice red on the inside and a dark red on the outside. You break them in two and they will be a dark brown. Is this in any way detrimental to the tile?

Prof. Elsom—I think that perhaps after your tile are used you will see they are just as good as you can make them. I don't think they are injured. My experience has been that there is very few tile placed on the market that will not stand extraordinary pressure. There is very few that break.

Mr. Gardner—The reason I asked this question is, I sell a great many of them, and sometimes one of them gets broken and the people come to me and say, "What makes that dark color?" I tell them I don't know. It is like stone. I can't tell you what it is. They have a perfect, hard ring.

Adjourned to meet at 9 o'clock Thursday morning.

FOURTH SESSION.

The fourth and last session was called to order Tuesday morning at 9 o'clock.

Pres. Eudaly—Gentlemen, you will please come to order and we will proceed with the business of the day.

Mr. Powell—I move that a nominating committee be appointed, consisting of Mr. Postle, Mr. Wagoner and Mr. Tiffany.

Motion carried.

Pres. Eudaly—The first number of the programme this morning is a paper by J. W. Everal, of Westerville, Ohio, entitled Tile and Brick Manufacturing Combined.

Mr. Everal read his paper, (see page 309), which was listened to very attentively.

Pres. Eudaly—Gentlemen, Mr. Everal's paper is open for discussion.

Mr. Tiffany—I rise to a point of order. We gathered here yesterday morning, and our president was missing, and the first thing on the programme was the President's Address, now I think the next thing on the programme this morning should be the President's Address.

Pres. Eudaly—I am sorry to say, Mr. Tiffany, as much as I would like to make an address I will have to rule you out of order.

Mr. Wagoner—I appeal from the decision of the chair and move that we now hear the President's Annual Address.

Cries of "Second the motion."

Motion carried.

PRESIDENT'S ADDRESS.

Pres. Eudaly—Gentlemen, this custom of the President making an annual address has been omitted from our programme for a number of years. I know it was omitted last year. At the National Association generally a few remarks are made congratulating themselves on the success of the work of the Association during the past year. In speaking to you this morning, I certainly am at a great loss to know what to say. I don't mean to say by that that I have not thought about this or about an address, for I have, and I have wondered what would be the best thing to say under the circumstances. You certainly don't expect me to take up any of the leading features connected with the manufacture of clays and discuss that question. It would be a very easy thing for me to take up some branch of the business and discuss it, then I would be discussing something I knew something about, but when I stand before you without a subject other than that of congratulating ourselves that we have been permitted to live another year and come here and discuss the important points of our business and as Mr. Everal has suggested in his paper it is a very broad subject.

Now, the question is, gentlemen, what is the object of this Association? When that is determined, are the results of our work from year to year in this Convention such as to meet with our expectations.

Whether or not the work of this Association meets with your approval, I am afraid to say. I am not the proper person to decide. Not because I happen to be chairman of this Association, but because I do not think I am capable of judging whether this Association is a success socially, financially or from a business standpoint, but there are a few things that I may mention.

This Association originated in the interest of the tile and drainage men of the State. Many of them in the course of time became interested in the manufacture of brick, as we have heard in the paper just read, so that the brick interests of this Association have gradually grown. I have heard no objection, but still, some may be urged that too much attention is given to brick and not enough to the tile interests. It so happened, and perhaps may be regretted, the program committee appointed last year reported to me that it was impossible to get the tile manufacturers to respond and take a place on the programme, and they were, both last year and this year, compelled to get men directly interested in the manufacture of brick. Then again, formerly in our meetings such a thing as inviting men directly interested in the manufacture of machinery to prepare papers to be read before this Association or other Associations in different States, would have been looked at rather in a critical way. The man that came into our Association who was known to be directly interested in the sale of machinery or any of the appliances for manufacturing was looked upon with a great deal of suspicion, and if he got the floor too often and kept it too long he would certainly hear from some of the members indicating that it was not pleasant to the Association. And furthermore, I will say that up to the meeting of this year I have never failed to see the chairs and seats almost covered with advertisements, and if you will look over the chairs and seats to-day, you will find none, even though we have machine men with us, but some way or other, without anything special being said to them, we don't see their advertisements. This is very strange to me. I feel almost certain that they have not been intimidated but that such things were not pleasant. I have attended this Association for several years. I must confess that when I began coming I supposed I could do some business at the Convention, I have long since learned this is no place for business, therefore, I don't try to do any business. So, also, in our National Association. At our first meeting we were just literally covered up with advertisements and, also, in Chicago, and Memphis; there were less in Philadelphia, and practically none in Indianapolis at the last meeting. There were quite a number of circulars in the room prepared for the exhibit of brick, etc., I only saw one gentleman distributing circulars in the hall of the Convention. Now, there were no resolutions passed against them, but people throughout the State have come to learn that the

Convention is no place to transact business, and the gentlemen in the Convention have made it so interesting to the gentlemen who have machinery and the like for sale that they have forgotten that they have anything for sale, and are learning something, and they gather points from our discussions that are very valuable to them in the way of adding improvements to their machines. I have talked upon this for some length solely for the purpose of bringing before us the fact that our meetings are very profitable to us, and that our discussions relative to the different ways of manufacturing, etc., have become more interesting than appliances men may have for sale. These questions are growing upon us. These questions of mining clays, preparing them for the machines, drying our clays, the handling of them, selecting of them, and all of these questions are coming so close to us that we have no time to discuss which is the best brick machine. Now, I have not a word to say against machinery, but men have learned that when we meet together there are questions of much greater importance for us to discuss, and the man who has machinery to sell has a whole year in which to go and visit you and tell what he has, while we only have two days in which to compare notes with reference to what we have done the past season, and advise each other what is best to do in the next. We should congratulate ourselves right here upon the success of our State Association. While I admit that many frivolous things come into our discussions, many things are discussed to bring out very little new, but the professor of an educational institution says you don't learn so much from the new things as from constant review. Take our educational journals printed throughout the country, they review, review, review; so it is with us, while perhaps, many things come up that is not new, yet constant reviewing impresses them upon our mind.

Another thing, gentlemen, we don't want to overlook, the fact that heretofore the papers and such remarks as the trade representatives and the trade journals could gather up in the Convention have been published. These publications have done us a vast amount of good. We hear the papers read here from the floor—we can't put many of the arguments together as the papers are read rapidly; we have not the strength of mind to do it. When a paper is read, then a short discussion, then another paper is read and we lose much of the matter that is produced in the Convention, so that the publications of these papers have aided us very much.

Now, gentlemen, let us seek that which is best for our own good. Let us, in the future use the columns of our trade journals, to speak to one another during the entire year. Let us not hesitate to answer the questions that may be propounded in their columns one to another. We don't lay hold of this as we should. We should improve the opportunities of using the columns of the

various trade journals and in this way we can have a Convention the entire year.

I thank you for the attention, and trust the stenographer will make such corrections as she thinks best. [Laughter.] (Turning to the stenographer), Send me proof and I will cut out several pages. [Applause.]

Pres. Eudaly—The next thing on the programme, I am quite certain, will be very entertaining to you, in view of the last topic.

Mr. Wagoner—I will have to call you to order again. The last subject, (the President's Address), has not been discussed.

Pres. Eudaly—You can't discuss it until I leave the floor. [Laughter.] The next number on the programme is an address, "Progress of Our Art," by B. W. Blair, of Cincinnati. Brother Blair has been detained at home. He writes that he regrets exceedingly his enforced absence, wishes us a pleasant meeting and promises to be with us next year. The next is an essay, "Artificial Drying, by F. E. Frey, Bucyrus, Ohio.

Mr. Frey read his paper which is given in full on page 312, and at its close was tendered a vote of thanks.

DISCUSSION.

Mr. Biglow—I would like to ask Mr. Frey what kind of dryer he thought best for drying drain tile.

Mr. Frey—I would say any of these dryers can be used.

Mr. Powell—I would like to ask Mr. Frey what they did with the men that were working in the shed when they dried the brick in 11 hours.

Mr. Frey—I can not answer that question. It is only what was stated to me—that they dried brick in 11 hours on these steam heated floors.

Mr. Raymond—What is the estimate cost per tunnel of a dryer similar to the one you described in your paper?

Mr. Frey—They are about in the neighborhood of \$500 to \$550. That is, counting in your track, not the building.

Mr. Wagoner—We have with us to-day the father of this Convention. No man has done for this convention what this man has done. He is always ready to give us something on tile drainage and if he is prepared this morning, I would move that we tender him a portion of our time. I suppose you all know that I refer to Mr. J. J. W. Billingsley?

Cries of "Second the motion."

Motion carried.

Pres. Eudaly—The next number on the programme is a talk by Mr. Billingsley.

Mr. Billingsley—There is a story told on Gov. Foster, over in my State, and as the Governor has recently been appointed Secretary of the Treasury, it may be well to tell it here. On one occasion he was visiting the penitentiary and they called the prisoners together that he might speak to them. He com-

menced the speech by saying, "Gentlemen, I am glad to see you all here." [Laughter.] I feel very much like the governor, this morning, I am glad to see you all here, and I would say in connection with what Mr. Eudaly has said, the attendance has been more regular at this Convention than at any ever held in this State. I counted this morning 74 people, and last night 75.

I have a paper here that I read before the Iowa Convention. It is in the form of a story, and was intended really to bring out some points in the manufacture of tile. I am afraid it will prove rather an old chestnut to my friend Pike.

Mr. Billingsley then read his story entitled "Anna and I," which briefly outlined the history of a man and wife and their management of a tile factory and 40 acres of land, the latter furnishing half the capital and taking an active part in the business—making a success of the tile business and a superb home on the 40 acres of land.

Mr. Raymond—Was the plot of this story laid in this country.

Mr. McClure—I would just like to say to Mr. Billingsley, that as he travels over the country, and sees ladies like the one he described as Anna, if she wants an interest in a tile factory and has \$783, that she can have an interest in the Warsaw Tile Factory. [Laughter]. If Mr. Billingsley will give me the address of such a young lady I will try and come over to the next convention of the Ohio Tile, Brick and Drainage Association with a new partner. [Laughter and applause]

Mr. Billingsley—I would like to say to the brother, Be not discouraged, there are such women.

Mr. Elsom—I think it would be out of order to appoint a committee to assist Mr. McClure.

Pres. Eudaly—I will appoint such a committee with Mr. McClure as chairman.

Mr. Elsom—It is a good investment. When I was married I was 85 cents in debt, and have paid it all off.

ELECTION OF OFFICERS.

Pres. Eudaly—Such scientific questions are too much for me, we will pass on the next order of business which is the election of officers. We will hear from the nominating committee.

Mr. Postle, Chairman of the Committee—Our committee reports as follows: For President, J. W. Everal, Westerville, O.; for Vice President, B. W. Blair, of Cincinnati; for Secretary, W. D. Richardson, North Baltimore; for Treasurer, S. E. Hagy, Etna, O.; for Programme Committee, J. W. Everal, B. W. Blair, W. D. Richardson.

Mr. Hagy—In making changes, would it not be well to change the treasurer also.

Mr. Wagoner—First man I ever heard of who was tired of money.

Mr. Billingsley—I move the adoption of the report.

Motion carried.

Mr. Randall—I move that the Secretary of this Convention cast the unanimous vote of the Association for the election of the gentlemen named by the

nominating committee for the officers of this Association for the ensuing year.

Motion carried.

Mr. Landrum—I have no doubt, but that Mr. Everal will make a good presiding officer, we have faith to believe he will, but, nevertheless, I, for one, am in favor of tendering our retiring officers a vote of thanks for their services. I make this as a motion.

Motion carried.

Pres. Eudaly—We will take up the order of business. The next order on the programme is an address on "Drying and Burning Drain Tile," by Mr. Elliott, of Pittman, O.

Mr. Elliott spoke extemporaneously, telling of his personal experiences in making tile in a very entertaining manner, that elicited a lively discussion of the subject.

Pres. Eudaly—We will now have a paper on the "Approved Methods of Laying Street Pavements," by H. S. Hallwood, Columbus, Ohio.

Mr. Hallwood read a lengthy paper devoted chiefly to the advocacy of the Hallwood block as a paving material. The paper was not what had been expected, and as the hour was growing late and many of the members desired to leave for home, there was no discussion of the paving question of any consequence.

Treasurer Hagy read his annual report, which showed a small balance on hand after defraying the expenses of the meeting.

Mr. Randall—I move that the Secretary be authorized to draw warrants on the Treasurer for any and all expenses incurred, the same to be paid when properly countersigned by the President.

Mr. Griswold—Second the motion.

Carried.

Mr. Powell—I move that we adjourn to meet the second Tuesday and Wednesday in February, 1892. [Carried].

HOME OF THE BOYD PRESS.

The firm of Chisholm, Boyd & White, the most extensive manufacturers of dry pressed brick machines in the world, have their elegant and commodious city offices in Monon Block. They occupy the whole Dearborn Street frontage on the ninth floor, seven rooms in all. This firm was organized in 1888, and is composed of Samuel S. Chisholm, James A. Boyd, and B. Clarke White. The firm recently purchased and equipped large, machine shops within the city limits. Their property comprises five acres of ground and extends from Fifty-sixth to Fifty-seventh Street on the Western Indiana Railroad. Their shops, 250x80 feet, are fitted up with the most modern improved machinery and tools, especially adapted for making these powerful machines, which they are now manufacturing on a large scale. The firm has also a testing-room at 130 South Clinton Street, where a press is constantly at work testing samples of clay sent them from all parts of the country, from Maine to California and from Canada to Florida.

In their offices they have samples of perfect and beautiful brick of all colors and styles, made from hundreds of different clays. This firm is the chief exponent of the dry press process of brickmaking, which is rapidly taking the place of all other systems of making brick for all purposes. Instead of the brick being molded from plastic clay and allowed to dry, as in the old methods, the dry clay is pulverized as fine as sand and spouted into the press, which is a machine of such tremendous power that the brick come from it polished like glass and of great hardness. The action of the press is automatic, and the brick are taken directly to the kiln and burned. Judging from the samples on exhibition in their offices the brick are certainly the finest in the world. The process seems destined to become the universal method of brickmaking.—*Chicago Times*.

A Brick Poem.

*BY D. O. LOY.

In a beautiful garden on Eden's fair plain,
Our old Mother Eve began to raise Cain.
Now if we believe what historians say,
Cain was much harder than vitrified clay.
A patent brick clamp advertise if you will
But Cain was the man who invented the kill.
For brick kilns in Eden there were no demands,
So Cain was advised to seek other lands.
In that olden time when the world was new,
They never used brick for a cellar or flue.
No well brick were used at the time Adam fell
For long ages since Jacob dug the first well.
No cisterns were made in that garden so new
For Adam and Eve had no washing to do.
The first brick made at Babel was used
Where brickmakers language was mixed and confused.
Though that tower was a failure, the bricks which
were made
By those ancient people established our trade.
From that day till this in each civilized land
For brick there has been an increasing demand.
When Jacob's grandchildren in Egypt were kids
They were moulding the brick for the huge
pyramids
And our minds often wander back to that day
When those slaves made brick from stubble and clay
And we fancy we hear old King Pharaoh ask
Those Hebrew slaves to increase their task.
And we fancy they moistened the clay with their
tears
While moulding brick in those ancient years.
But we know that those slaves whom that king
possessed
Have long since gone to their home of rest.
And the king who ruled with pomp and pride;
That king and his children have long since died.
Of his royal palace, his crown or throne
Not one relic of these, to-day is known.
That king and his children are mummies to-day,
Yet their language we read on the bricks made of
clay.
The Egyptian kingdom; its rise and fall,
Hieroglyphics on bricks has told it all.
Before Moses from Egypt went out on a strike,
He invented a kill claimed by Castle and Pike.
And the Stewart brick kiln is laid in the shade,
For the Hebrews burned bricks before they were
made.
Near an ancient city deep under the ground,
A kiln like Eudaly's was recently found.
Articles on brickmaking in the JOURNAL appears
Which have been composed over three thousand
years.
Like those Hebrew slaves we will soon pass away,
But the bricks we have made will never decay.
Then I'll write on each brick in the mould that I
cast,
A message of love that forever will last.
A poem on brick at once I'll commence,
To be read by brickmakers ten thousand years
hence.
Were I choosing a brick from the new or the old,
I would not select a brick made of pure gold.
A brick made of pure gold, time would surely de-
stroy,
While a brick would last always if made of a Loy.
If you doubt what I say I'm ready for that,
For I always carry a brick in my hat.

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Workers is solicited. Communications from practical
men will always be welcome. Address all
communications to

T. A. RANDALL & CO.,

81 Massachusetts Ave. Indianapolis.

DON'T MISS IT.

We have received some very interesting communications, which, for lack of space, we must hold over till the following (April) number. That issue will be an uncommonly interesting one and will contain instructive papers and entertaining letters from well-known writers and clayworkers on many practical and important subjects. In short the April CLAY-WORKER will be crowded full of good things.

LABOR AND LUCK.

Some philosopher has wisely said: "Luck is waiting for something to turn up; labor, with keen eyes and strong will, will turn up something. Luck lies in bed and wishes the postman would bring him news of a legacy; labor turns out at 6 o'clock, and with busy pen or ringing hammer, lays the foundation of a competence. Luck whines; labor whistles. Luck relies on chances; labor on character. Luck strikes down to indigence; labor strikes upward to independence." These axioms apply to us all. The paving brick manufacturers are frequently heard to complain of the stupidity of city engineers and municipal authorities for persisting in putting down asphalt and other expensive material instead of using brick, which is known to be less expensive and more durable, and wonder why it is that people are so slow to comprehend the value of brick pavements. But it is not so very strange, for while the brick men sit complaining

the asphalt men are out early and late, working apparently with the enthusiasm of fanatics and the faith of saints, to convince people that their tar is *the only reliable* paving material. Enthusiasm is catching and people generally have faith in the thing the advocate himself has faith in. Appreciating this fact the asphalt and block pavement people use their influence and their money too to advance their interests. They use the columns of the daily press, if need be, paying roundly for the privilege, to sing the praises of their product into the public ear. They do not wait for the current of public sentiment to set their way but diligently and persistently proceed to mold it to their own purpose. It seems to us a lesson might be learned from this. That the advocates of brick might profit by the example of their competitors. Will they do it?

ALWAYS PROFITABLE IF JUDICIOUS

Not infrequently we meet men who willingly pay \$10 per day to a traveling salesman, and yet hesitate to invest \$10 per month for advertising, feeling that it is a doubtful venture. As a matter of fact, the latter, assuming, always, that it is judiciously done, will often earn more than the ten dollar man, because it not only effects sales direct, but it introduces and assists the salesman. The buyer who sees the advertisement of a house month after month, feels personally acquainted with the house, and finally begins to take an interest in it. He may seem indifferent about it, because he does not happen to want the advertised article at the time. But the indifference vanishes the instant he wants to buy. Many large advertisers pay large salaries to experts to manage their advertising, and many others succeed by placing their orders with houses competent not only to fill them, but to help in the production of original, catchy advertising matter. Everybody knows about Pears' soap, while John Smith's soap, equally good, perhaps, is unknown. Advertisers are too prone to measure the value of their advertisement by the number of inquiries in which the would-be purchaser happens to mention the paper in which he saw it. But how many of us ever do that when we open a sale. Perhaps we have forgotten exactly where we saw it, and yet its silent work was accomplished. There are advertisers who gain \$100,000 a year through advertising alone, while others lose that amount by keeping quiet. It pays to

advertise in a live, progressive magazine—for instance, the CLAY-WORKER.

ECONOMY OF THOROUGH WORK.

Several of the cities of England have adopted methods in paving that we could copy with profit. They require the work to be most thoroughly done, thus the cost of maintenance is greatly reduced. Liverpool has now 250 miles of the best laid pavements in the world, and the wisdom of this is seen in a death rate reduced from 27 to 20 in eight years, from 1880.

The estimated cost for keeping 226 miles of pavement in repair in 1879 was \$136,000, while in 1889 the estimate for 250 miles was \$40,825. Permission is never given individuals or corporations to cut through the pavement for any purpose. This is done by the city, and the interested parties must pay the entire cost. All the street railway tracks are laid, owned and kept in repair by the city and the company using them pays an annual rental of 10 per cent. on their cost.

All this indicates what American cities should do. See that the pavements are solidly laid, on firm foundations, then not allow them to be chopped up by Tom, Dick or Harry, who never take pains to properly relay them. No paving material can give satisfaction if managed in this loose way, though brick will come nearer doing it than any other.

FROM A TRADE TO AN ART.

The great size and height of modern buildings in our large cities has compelled more attention than ever to fire-proof construction. Twenty years ago, iron was the preferred material, taken presumably for its fire resisting quality. But conflagrations like those of Chicago and Boston demonstrated that iron was the worst possible material. Then followed a general use of stone. Brick was not preferred from its then lack of artistic appearance and want of capacity for effect and expression. Stone, however, proved unreliable as a fire resisting material, and some of them, in fact all except the sandstones, were found to easily disintegrate with the heat of a common not to say great conflagration.

But brickmaking has developed from a common mechanical occupation, into an art. Forms have altered from the stiff 4x8 formula, to suit artistic situations in fronts, pilasters and cornices, and finally the crowning development is

reached in the rapid and cheap production of the most elegant art forms and expressions in terra cotta, until now clayworkers produce the best material for the most pretentious or elaborate structures, while retaining and in fact increasing the well known fire resisting qualities.

Only one thing is yet desired in order to render the fire-proof condition absolute, and that is a fire-proof mortar. The brick itself is practically indestructible by any heat possible in a conflagration. The mortar will crumble, with its lime base, and weaken the wall. A mortar has recently been invented by a German chemist that answers perfectly 'tis said, but its great cost precludes its use, except, perhaps, for some particular purpose, as fire-proof vault construction where expense would be no object. There is not a single field for invention that would reward the one better who can discover a mortar that would be both fire-proof and sufficiently cheap to be available.

But, however, brick and terra cotta is being generally preferred, and never has there been such general preference shown for this material as is foreshadowed for the coming season. Safety and durability are beginning to usurp all other conditions in the erection of large buildings—a usurpation that has been rendered permanent to brick and terra cotta by their becoming thoroughly artistic.

LOOK PLEASANT AND GET BUSY.

The great manufacturing and business interests of this country are in a most enduring condition; if they had not been the financial panic that threatened to usher in the year would have been widespread and disastrous. That the panic did not come is due to the absence of speculative business among our representative manufacturers and the really prosperous condition of all classes of our population. There is every evidence that the building boom promised for next season will materialize for there is a promise of a splendid crop year, so free from the winter's accidents that they seem almost secure. Last year was a good one, notwithstanding the panic and crop failure. Manufacturers have gone right along and paid the regular salaries, and even higher ones, and the wages have been expended for the material comforts of life, that keep up the activities. Some of our people have got into a bad habit

of grumbling, as if they wanted the earth and must have it or be unhappy. Instead of looking at what they have got, or to the advance they have achieved, they grumble because there were some things they did not get. Individually and as a nation, we are at least secure in our livings, and those the best afforded in this world. We can almost say our industries are equally secure, and also the most prosperous. This condition ought to inspire self-confidence and good humor, courage and energy. The requisite for all of us if we wish to get on good terms with the world, is to first get on good terms with ourselves, and then—advertise.

A NEW BRICK MACHINE.

On page 326 our readers will find a cut of a new brick machine though one bearing a very familiar name. The manufacturers, The Tiffany Iron Works, is a new firm, and yet the name will sound like one very well known to clayworkers throughout America. Few names, if any, are so intimately connected with the brick and tile machinery interests as *Tiffany* and there are none more universally respected by the clayworking craft. Geo. S. Tiffany, the president of the new firm, needs no introduction to our readers, but they will one and all be interested in his latest production, the *New Centennial Brick and Tile Machine*, which Mr. Tiffany is confident has advantages that will soon gain for it a front place among its kind.

One of its chief merits is the substantial manner in which it is constructed—strength is a very important factor in clayworking machinery.

We would like to give a description of the new factory the Tiffany Iron Works have erected and equipped for the special purpose of manufacturing clayworking machinery but lack of space forbids and we must defer that to a subsequent issue.

BRICKMAKERS' WAGES.

At the regular meeting of the Brick Manufacturers' Association of Philadelphia, held last Wednesday night (11th), a resolution was adopted to the effect that the scale of 1889 be resumed, which is about 25 cents less than last year's scale. This gives \$2.00 for bottom brick, \$3.00 for sorting and \$3.00 for topping. The demand made by the workmen is a general advance on the present scale of about 25 cents.

EDITORIAL NOTES and CLIPPINGS.

Somerville, N. J., wants a brickyard.

Abbeville, Ala., is to have a brick plant.

Oskaloosa, Iowa, has a paving brick plant.

Elgin, Ill., is suffering from a brick famine.

Asheville, N. C., is paving her streets with brick.

A brick plant is to be started at or near Belle Plain, Wis.

Dayton, O., is beginning to put down brick pavements.

J. E. Pinkham will make brick at Dover Point, N. H.

J. L. Sunday is building a brickyard near Hamburg, Pa.

E. F. Tuller talks of starting a brickyard at Elmwood, O.

Watkins & Brown, Kokomo, Ind., will start steam brick works.

C. C. Jenkins has bought Heckard's tile factory at Tolono, Ill.

Nelson Lovell has purchased the tile factory at Dalton City, Ill.

Atlanta, Ga., is about to adopt vitrified brick for paving her streets.

Rich deposits of brick clay have been located near South Joliet, Ill.

S. Gibson & Co. will make brick at Youngstown, Ohio, this season.

Alexandria, La., expects to acquire a brick and tile plant this spring.

J. W. Williams & Co., will establish brick works near Greenville, Ala.

Burlington, N. C., is to have several new brickyards the coming season.

South & Collins will probably start brick works near North Columbus, O.

A. P. Wilmott, Knolls, Va., contemplates engaging in the brick business.

Dunkirk, N. Y., is agitating the paving question and will likely give brick a trial.

The Sheridan (Ind.) Brick Co. has been incorporated with capital of \$50,000.

Mr. Patton, of Rantoul, Ill., will probably start a tile factory at Manson, Ia.

There is talk of starting a brickyard near Abbot, Me., to utilize the slate refuse.

H. Bischoff & Co. will erect brick works at Collinsville, Ill., in the near future.

The Kissel Fire Brick Co., Rochester, N. H., will enlarge their works this spring.

Cincinnati is agitating the paving question and will probably give brick a chance.

Jonathan Creager's Sons, of Cincinnati, write that they recently received an order by telegraph from Mexico to send by express one of their No. 2 Disintegrators. Mr. Creager adds: "The charges on the

pkg. (?) will be \$352.50. When they want our Disintegrator *they want 'em bad*, don't you think?"

Ray Todd, of Beaver, Pa., will move to Vanport, where he will engage in brick-making.

W. J. Perry & Co., Staunton, Va., are figuring on erecting brick works near that city.

It is reported that Boston capitalists are to establish a brick plant at Blackstone, Va.

Lawson Bros., Oxford, Ind., are looking for a desirable site for the location of a brick plant.

Jno. Baumgardner, Frederick, Md., is organizing a company to manufacture brick there.

E. T. Wilson and others are organizing a company to build brick works near Farmington, N. H.

Stevens Bros., Lincoln, Neb., will put in a large steam plant for the manufacture of all kinds of brick.

Chas. F. Kaul will put in a new engine and boiler and increase the capacity of his yard at Madison, Neb.

H. B. Birtwell, of Chester, Pa., has bought the brick works of Evens & Beatty, at Clifton Heights.

The Pittston (Pa.) Press Brick Co. are looking for a practical man to take the superintendency of their plant.

J. E. and C. E. Stephens have purchased ten acres of land near Lincoln, Neb., and will start a brickyard.

J. E. Watson and others, of Fairmont, W. Va., have incorporated the Globe Fire Brick Co. Capital \$50,000.

Mr. Eastman, of Chattanooga, is contemplating the establishment of a brickyard at or near Newport News, Va.

The Morier Mining Co., Clay City, Ind., contemplates the erection of a brick and tile plant at their Brier Hill mine.

Those wanting situations or experienced help should keep an eye on our "Wanted, For Sale, Etc.," columns.

J. E. & J. N. Foye, and H. G. Wiggins, have organized a company to manufacture brick at or near Seattle, Wash.

The Star Brick Co., Epping, N. H., has been organized by E. C. Allison and W. S. Pim and will at once build works.

Salmen Bros., of Slidell, La., want a good reliable and experienced man to take charge of their plant as foreman.

The Lancaster (N. Y.) Brick Co. is enlarging its plant. The capacity of the works will be increased to over 100,000 a day.

It is reported that Sheriff Runnell of Asheville, N. C., will engage in the brick business and build a plant near there this spring.

S. J. Rose and Sons of Chester, Pa., have been using Auger Machines in the manufacture of brick, but they find it

was not a success in their clay and they have placed their order with C. & A. Potts & Co. for one of their Horizontal Stock Brick Machines, No 2 A Disintegrator and Mould Sander.

W. D. Hedden, New Albany, Ind., intends to put in an artificial dryer and increase the capacity of his brickyard in that city.

Fremont, Ohio, is likely to be the site for a large tile works. Webb Hayes of that place and some eastern capitalists are interested.

Where vitrified bricks cannot be secured, ordinary hard burned bricks may be made non-absorbent by soaking in hot (boiling) coal tar.

The business men of Huntingburg, Ind. are making an effort to secure the establishment there of brick and tile works. They have plenty of good clay and coal they say.

The Levi Crockery Company has been incorporated, with a capital stock of \$50,000, and will erect a pottery near Chattanooga, Tenn.

The Whittaker Dry Press Machines appears in better form this month than heretofore as our readers will notice by turning to pages 296-297.

The Main Belting Co. submit some interesting matter on page 300. Their Leviathan Belt has proven to be the best for brickyard purposes now in use.

A company has been chartered with a capital stock of \$35,000, to build and operate at Salineville, Ohio. The town gave a building site and \$1,000 in cash.

J. C. Dupoyster and others are getting ready to start a brickyard at Ft. Jefferson, Ky. Want an experienced superintendent to aid in the selection of machinery, etc.

Wm. M. Louderman, 105 N. 2nd St., St. Louis, is looking for a suitable site for the location of a Hydraulic Dry Press brick plant within shipping distance of Chicago.

Thad. S. Smith, the well known brick manufacturer of St. Louis, Mo., is putting in one of Simpson's new improved dry press brick machines, a cut of which is shown on page 295.

The Colchester (Ill.) Paving Brick and Tile Co. has been organized and is now putting in machinery, with daily capacity of 40,000 brick. They will make paving and building brick and drain tile.

Jno. W. Sibley of Coaldale, Ala., writes that the Coaldale Brick and Tile Co. contemplates erecting a plant for the manufacture of fire brick and would like to receive quotations on suitable machinery.

Good, practical, reliable workmen are always in demand. Those competent to superintend and manage brick works can readily obtain desirable situations by making proper announcement in our "Wanted" column.

W. D. Hedden, New Albany, Ind., would like to correspond with a practical brickmaker desiring to invest in and take superintendency of a profitable plant the entire output of which is readily sold at good prices.

The Tiffin (Ohio) Agricultural Works write that they are having an excellent trade at present, both in their "Tiffin Automatics" and their "Old Reliable" brick machines, as well as in molds, pug mills, crushers and brickyard supplies.

The Brownsdale fine pottery works, owned by the Blackhurst Bros., Austin, Mich., has been burned. The fire caught from the kiln. The loss is heavy, as the entire patterns of the plant were destroyed. The works will be rebuilt at once.

"Still Another Brownie Book" is the title of a unique and attractive pamphlet issued by E. M. Freese & Co., Plymouth, O. Those of our readers who appreciate a good thing in the picturesque line can enjoy a good laugh by sending for one and see how the "Brownies" make brick.

Reber Huston, of Monticello, Ill., writes that that city offers decided advantages for the establishment of large brick works. They have unlimited deposits of excellent clay for both building and paving brick, good shipping facilities and cheap fuel. For full particulars address Mr. H.

Mr. Burkman, superintendent of the Union Pressed Brick & Terra Cotta Co., was recently assaulted and seriously injured by a discharged employe. The former superintendent was shot at and narrowly escaped with his life. We presume there will be a vacancy there now for a good experienced man.

If our readers will simply write the words "CLAY-WORKER" on the margin of their letters when writing to our advertisers for circulars, etc., they will confer a favor both on us and the advertiser. The latter is anxious to know the source of the inquiry and the words "CLAY-WORKER" will tell the whole story.

Messrs. C. & A. Potts & Co. report trade very good, they having closed contracts for 12 complete outfits including their Horizontal Stock Brick Machine, Disintegrator, Mould Sander and Trucks and Barrows. They are now running their works to its full capacity, having more men than ever before in their employ.

Jas. Means & Co. of Steubenville, Ohio, have in course of construction Dry Pans, Pug Mills and other clayworking machinery for the South Zanesville Sewer Pipe Co., South Zanesville, Ohio; A. O. Jones & Co., Zanesville, Ohio; Buckeye Fire Clay Co., Uhrichsville, Ohio, and Wm. G. Barnard Fire Clay Co., Bellaire, Ohio.

The Franklin Vitrified Brick and Terra Cotta Co. has been incorporated. The officers are J. D. Barker, Girard, president; T. M. Carroll, Paola, vice-president; D. C. Goodrich, Leavenworth, secretary and treasurer; U. B. Pearsoll and H. W.

Pond of Fort Scott, being two of the directors. The company is capitalized at \$100,000 and its plant will be located near Rantoul, in Franklin County, Kan.

Geo. S. Pollock, of Sullivan, Ind., writes that there is an excellent opening there for a good enterprising man to establish a paving brick plant. There is an unlimited quantity of excellent clay and cheap fuel and a large and growing home market. Mr. Pollock will be pleased to correspond with any one desiring further information.

One of the results of the great lockout and boycott among the New York craftsmen last year is the combining of the brick manufacturers of that city and vicinity. More than a hundred firms have agreed to unite in a trust for the purpose of dispensing with the middlemen or salesmen and to regulate prices, etc., so that a more regular and reliable market may be secured.

Jessee Adams, President of the National Brick Manufacturers Association, also Brick Maker of the President of the U. S., has placed his order with C. & A. Potts & Co. for a complete outfit of brickmaking machinery for his new yard at Sheridan Ind., including the Horizontal Stock Brick Machine, No. 2 A. Disintegrator, Mould Sander, Moulds, Trucks and Barrows. Mr. Adams has spent considerable time investigating the various machines on yards in different parts of the country and there is no question but what he will make a model plant at Sheridan. Mr. Adams is a practical brickmaker and C. & A. Potts & Co. feel very much honored by his decision in purchasing their machinery.

A NEW AND VALUABLE BOOK.

"BRICKMAKING AND BURNING," T. A. Randall & Co., Publishers, Indianapolis, Ind., price \$2.50.

This is a handsomely bound and valuable work, being a practical treatise on Brickmaking and Burning and the management and use of different kinds of clays and kilns for burning brick, with a supplement for new beginners in that work and hints to bricklayers and builders. The author, J. W. Cray, Sr., is a successful brickmaker of many years' experience, and in this book has given in a plain, practical way, his views and experiences in all the details of the work. The book is a veritable storehouse of knowledge on the subject and should find a place in the library of every worker of clay. There is also much in the book of interest to architects and builders.

BRICKMAKERS' MANUAL.

We have now ready for delivery a new and very valuable book entitled, "Brickmakers' Manual," by R. B. Morrison, compiled and arranged with addition by J. A. Reep. It is an illustrated handbook for ready reference, and as a practical and exhaustive work on brick-making is undoubtedly the most valuable book ever published. The author,

Mr. R. B. Morrison, is better known to the readers of the CLAY-WORKER as "R. Brick," author of "Hints on Brick-making." The book is a compilation of "Hints" with much additional matter carefully classified and arranged. It is handsomely bound in cloth, with gold title and embraces over two hundred pages. Sent postage free on receipt of price, \$3.00. T. A. Randall & Co., Indianapolis, Ind.

THE FINEST TRAIN IN AMERICA.

The Southwestern Limited, via the Big Four Route, from St. Louis, Indianapolis, and Cincinnati to New York and Boston, equipped with Wagner palace sleeping-cars, combination library smoking and cafe cars, luxurious coaches, and elegant dining-cars, vestibuled from end to end, and running through solid via the great four-track New York Central & Hudson River Railroad, is conceded by competent judges to be "America's finest train," and with its terminal facilities in Grand Central Station, New York City, avoiding all ferries and transfers, offers advantages possessed by no other line. Take the Big Four Route on your next trip East. D. B. MARTIN, General Passenger Agent, Cincinnati, O.

A VALUABLE BOOK.

"DURABILITY OF BRICK PAVEMENTS," by Prof. Ira O. Baker. T. A. Randall & Co., Publishers, Indianapolis, Ind. Price 25 cents.

The subject of street paving is a very important one which has not heretofore received the attention its importance deserves. The above publication is timely and will prove of special interest to Engineers, as it gives in a terse, yet comprehensive manner, the results of experimental tests made by the author, for the purpose of determining the relative value of paving brick as compared with stone, wood, and other paving materials.

The results, as shown in this little book, are surprisingly favorable to brick, and it will doubtless be accepted as a text book by all interested in that line. The high standing and reputation of Prof. Baker, the author, as a civil engineer is ample evidence that the comparisons and statements are correct and authentic.

WILL YOU JOIN THE COLONY

Now organizing to locate in Maryland, between the Cities of Baltimore and Washington. Here are fine farming lands; low in price; adapted to EVERY branch of agriculture; an abundance of pure, soft water; delightful and healthful climate; near the best markets of the world; unsurpassed railroad facilities, with low freight and passenger rates, with quick time; educational advantages second to none; churches representing almost all denominations; refined and cultured society, etc. Only a few more wanted to complete the Colony, and if you want to join in one of the best opportunities of a life-time, now is the time. Farmers, business men, mechanics, and laborers, there is a chance for all. 100 per cent. profit easily assured in three years. Full information free of charge, furnished by M. V. Richards, Land and Immigration Agent, B. & O. R. R., Baltimore, Md.

ABOUT PULVERIZERS.

Nathan Stedman, Aurora, Ind.:

DEAR SIR—The 40-inch Clay Pulverizer built by you to our special order is giving satisfaction. We run it at a high speed and are reducing a very tough, strong clay to the fineness required for pressed brick, without heating of journals or even wearing of the cages. We cheerfully commend it to the trade as being all you represent.

Very Truly Yours,

TOPEKA PRESSED BRICK CO.

St. Louis, Mo, July 20, 1889

Nathan Stedman, Aurora Ind.:

DEAR SIR—We have been using one of your 40-inch Clay Disintegrators for two years and will say that no other disintegrator will prepare clay as nicely for dry pressed brick. It has a capacity of 30,000 brick in 10 hours and is a very durable machine.

Yours Truly,

COLLEGE HILL PRESSED BRICK CO.

PATENTS J. B. CRALLE & CO. Washington, D. C.

ILLUSTRATED HAND-BOOK FREE upon application. Mention this paper. 36 a.



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Keeping Up With the Times.

The FREY-SHECKLER Co., Bucyrus, Ohio, are enjoying an enormous trade in their large variety of Clay Machinery; nearly three times as large in January and February as during the same months in any preceding year.

The most notable increase is in Dry Pans, Pug Mills and Auger Machines suitable for making Street Pavers.

It is now fully established by numerous trials that first-class pavers can only be made by an Auger Machine. It is also an interesting fact, that over 60 per cent. of all pavers made in the United States are produced by the Frey-Sheckler Co's. Auger Machine.

It puts more clay in a cubic inch than any other method.

It works clay at just the proper temper to make a uniform, homogeneous brick.

All parts liable to break are made of steel. It makes as many brick in a day as can be taken care of. It has with it, as an essential accessory, the Neidergesaess patent lubricating die, which makes smooth surface, square corners, saves power and lamination.

Another new creation that is finding favor with Brick-makers is the new patent cutting table. It is adapted to either side or end cut brick and its capacity fully 20 per cent. above any hand table heretofore used. The column of clay keeps constantly moving, is cut into side or end cut brick whilst in motion, and leaves no fragment to be thrown back into the brick machine.

It is too strong to break and constitutes an important complement to their excellent sets of brick machinery.

The substitution of a short, polished plate with a lubricating roller at each end, for the six or eight rollers that usually carry the column of clay from the die to the cutting table, is also a popular improvement by which the handling and frequent cleaning of the sticky rollers is avoided.

The two rollers really bear none of the burden of the column of clay, but only roll gently on its under side, spreading over its surface a thin coat of crude lubricant which they carry from the oil reservoir in which they run.

The company has several new and improved machines which they will introduce to the fraternity during the summer.

Their clayworking experimental station which they have erected during the past year at Bucyrus, Ohio, at a cost of over \$50,000.00 enables them to thoroughly test their new inventions before sending them to their customers' brickyards.

The interesting 29th annual catalogue of the Frey-Sheckler Co., Bucyrus, Ohio, will be sent free upon application.

See ad. on page 375.

THE CLAYWORKER.

VOL. XV.

INDIANAPOLIS, IND., APRIL 15, 1891.

No. 4

Written for the Clay-Worker.

BRICK AND TERRA COTTA ARCHITECTURE.

THE accompanying illustration makes clear the proposition made in a following page with respect to the Parisian construction being suited to construction in terra cotta. The lower part is shown as being in stone and the upper part in brick, but the stone used in Paris is soft and easily fractured, and for that reason is used in small blocks. So soft is it, indeed, that it is not cut or carved until after it is in position. It hardens after it is in the building, though it is not very hard even then. If it were cut before being placed in position, the slightest jar or knock would destroy the moldings and carvings. Now it is known that terra-cotta is not suited to long lintels or large blocks. Neither is the Parisian stone. The large openings between the Corinthian columns of the Madeleine and the openings between the columns of the Louvre, and in all buildings of Paris where a straight top or line is desired, are made exactly as they would be if terra-cotta were the only material used; that is, these openings are made with straight arches like those which are made in brick in some of the buildings in America.

In speaking of the construction of the Louvre or the Madeleine, one would be justified in saying that it was an imita-

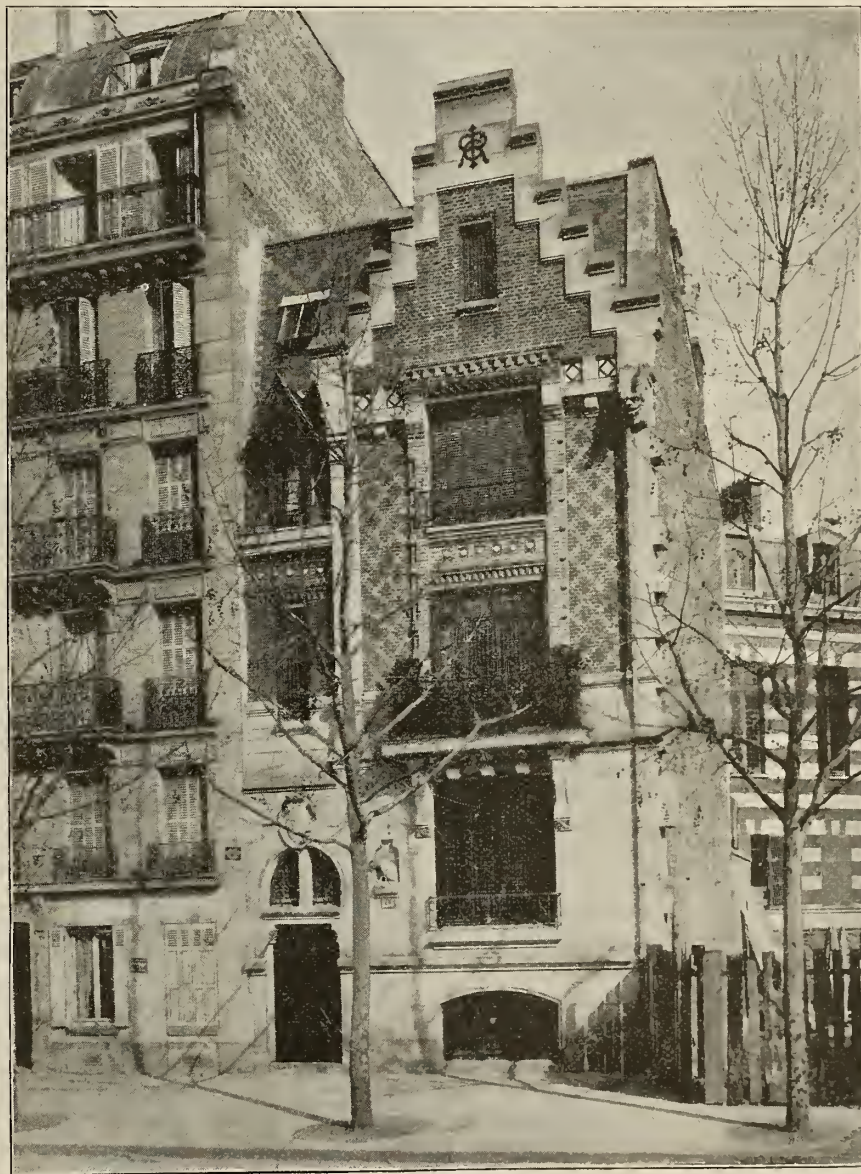
tion of terra-cotta construction. It certainly is not what one would call stone construction. Some of the long, straight arches in the Louvre are held together with a very elaborate iron frame work. One would suppose that in build-

case of terra cotta, the use of this iron would be justifiable, but the use of iron in this way is not justifiable with stone. A little fire would expose the iron and destroy the building.

If we take the illustration which is given herewith, we may assume that all parts which are shown in the white stone could be of terra-cotta blocks, buff or other color, and that the bricks could be used as here shown. When considering the general style of construction it is difficult to conceive of anything more rational. Terra-cotta does what stone does not. It preserves its color and general texture, and is not in any way effected by the weather. The Parisian stone is generally regarded as having good lasting qualities. However, in the Opera House, which has only been built a few years, or the Gambetta Monument in the Louvre, which has only been up a short time, we find already evidences of decay.

No one ever knew terra cotta to decay. Such a thing is not thought of. It is not effected by the weather, by chemical constituents in the atmosphere or extreme artificial or

natural changes in temperature. This is something which cannot be said of other building material. Terra-cotta and terra-cotta blocks is certainly the building material of the future. If we make the blocks quite as large as can be handled by hand



A PARIS RESIDENCE.

ings of this character an effort would have been made to get stone which would cover the openings without all this expense. However, this was not done and instead of that we have the terra-cotta construction in stone. In the

and bricks one-fourth that size for the purpose of backing them up, a building could be put up very rapidly and very economically. It is to be noticed that with the large brick of Scotland that building operations are carried forward more rapidly than in England or France.

All the carving and detail work shown on this illustration is capable of execution in terra cotta. It is known that terra-cotta decoration is always more artistic than that done in stone. The terra-cotta is modeled in the clay in its plastic state and the artistic feeling of the artist is more readily transferred to the clay than into the hard stone with the chisel. The work of the terra-cotta modeler is direct and artistic while that of the stonecutter is the work of a mechanic and a copyist. It is creditable as a mechanical piece of work, but only in rare instances is artistic or expressive. Terra-cotta block construction is the construction of the future. Like other new things, it will come in slowly. It is best that this should be so; better this way than with a rush and carelessly, and accompanied with failure. But so sure as it gets the right kind of a start, is properly decorated by the hand of an artist, it is certain of success. It will be popular. We all know that clay burned is the best possible building material. When used in terra-cotta blocks either with plain surfaces or with proper decorative effects, there can be no question as to its constructive and artistic value. The stone construction of Paris indicates what may be done with small terra-cotta blocks.

The subject of trade school has been much agitated of late years and their lack much deplored by all thinking men. It may surprise our readers to learn that Chicago has had a Trade School in operation several months and that it has proved highly successful, over thirty students having been enrolled in brick-laying alone. Day and evening sessions are maintained in all departments. A large addition to the school building has been built of brick by the students who will under the direction of their teachers do all the work connected with its completion, thus demonstrating the practical character of their instruction. The School will prove a boon to many struggling young men and we are glad to learn that the leading Chicago firms in the building lines are taking an interest in the success of the work.

NOTES OF TRAVEL.



of the writer without having to turn over a leaf and then if, as in this instance, my friends assure me is the case, the likeness is a true one, free from all the unnatural stiffness of sitting for one's picture, yet full of graceful lines showing a degree of thoughtfulness, yet not to the extent of losing the world's goods, as indicated by the grip on the "carpet sack," yet pondering on those mysterious words on the shop window, to the extent of almost appearing unconscious of the speaking looks of the small boys who are rapidly forming into a background for the picture. But, Mr. Editor, this won't do. It may make you think me vain to talk in this way and refer personally to your kindness in placing my portrait before your readers.

In writing you again so soon from Nashville you may think I am repeating quickly, but such is not the case, for the Nashville I find to-day is entirely different from the one of which I wrote you in my last. The river is on the rampage. On calling on our friends, I find them philosophers, indeed. They have finished their fight. They have done all that could be done and did not give up till there was nothing left to do, and having done all that was possible they are now "taking their medicine." The waters of the river have risen gradually but surely, until they have covered their yards. They have watched them creeping gradually up into their kilns of green brick, covering the machines, clay, drying floors, etc. They have fought gallantly, building embankments only to see them washed away, and fighting in every way and everywhere, only to be beaten until finally, seeing their property all under water, they are simply waiting for the flood to go down and are then ready to begin again with renewed energy to build up again and repair the damage.

By the way, isn't it funny how our

MY picture appeared at the head of my last letter, my cup of happiness was indeed full and running over. It adds so much to a letter to be able to look at a likeness

troubles vary in the different localities? Here in Nashville now, for instance, the great trouble is too much cold water, while at the very same time countless yards all over the country are in trouble from too little cold water and too much of something stronger.

In Rome, I understand, the great difficulty is to keep the goats from eating the yard up. Further south the trouble is with the barnacles and oysters gathering on the brick, while Bro. Purington's main trouble seems to be from setting fire to the buildings by kicking the brick into them too hot.

This line of thought is instructive of the wide diversity of experience we have in our calling, and yet I cannot help noting with joy that under all these circumstances, as well as the countless others which you all know so well, but which I cannot remember at this minute, the brickmaker always shows that firm spirit of hanging on to the end that ultimately brings him success. GATES.

A CLAY-WORKER SCRIBE ABROAD.

Paris Architecture.

I THINK I have met with an idea, from what I have seen of the Parisian architecture, which may be of great interest and benefit to clayworkers. Paris, be it known, is largely a city of stone. There are many beautiful brick structures but for the most part the work is done in stone, and very largely in a soft, light colored material, which does not appear to have great tensile strength. Sufficient to say that of that in more common use it is not adapted for long lintels to cover openings. Furthermore the general design of these stone structures is in low relief; that is, the pilasters and their decoration and the like have no excessive projections, without corbelling. Now, I bear in mind the Rand & McNally building in Chicago, which is a terra cotta structure, made of terra cotta blocks surrounding, for the most part, an iron frame work. I also call to mind that there are other structures of similar character going up in Chicago. Take the two facts together, the buildings in Paris with the stone which is handled in blocks and forms adaptable to terra cotta rather than stone, and the illustration of the possible use of terra cotta in connection with iron, as it is in the buildings mentioned in Chicago, and I think we find a suggestion which may lead to a new style of clay architecture. It is well to remem-

ber that most of the openings in the Parisian stone buildings, where they show a straight line over the top, are formed as we would make a straight arch in brick or terra cotta blocks and that all of their work is of this same general character. Even the sills are broken at times and covered with little laps over the top. It is in all respects an architecture adapted better to terra cotta than stone, and as terra cotta is a better material than stone it would be altogether a more rational architecture. Hence if designed in the same artistic spirit would yield a better result in all ways.

I have made a drawing of a front, such as is common in Paris. The stone joints are identical and the style of architecture that which has been in use, to a very large extent, since 1867.



It is to be noticed that there are no long lintels excepting those over the stone fronts, which would naturally be of iron. The straight topped openings are covered with what are known as straight arches. There is no reason why all of this, excepting possibly the first story support and of course the lintel, should not be of terra cotta blocks. The first story support might be of iron surrounded by terra cotta, which would certainly give an ideal construction. The entire front of the upper part could be of terra cotta bonded into the brick.

These blocks could be four and eight inches deep and would thus bond into the brick work, or they might be of uniform depth with the bonding piece fitting into the terra cotta. However, the former arrangement would be better. Varying effects could be secured by giving different surfaces to the faces. In some instances they could be smooth; in others slightly rough or stippled, and again as rough and protruding as desired. A front of the general design here shown could be varied as in width a foot or more without changes in the block. The pieces which come on each side of the vertical pilasters could slip in or out according to the width of the front; or by supplying other plain blocks changes of several feet could be made without being necessary to change the ornamental parts. Thus it could be worked as a stock front as sold and shipped to various markets according to the width required. In this way quite a large business could be done without an extraordinary number of patterns.

Terra cotta work is usually done at a very large expense because of the amount of hand work involved. This is true very largely because of the greatly varying designs and of the small amount of plain surfaces which usually belong to that product. However, if it were conducted on the principle which I here have in mind it would soon be found that this work could be, for the most part, done by machinery, and in that way be much cheaper.

In order to have a scheme of this kind meet with large success the work must be done at a low cost, and if this matter is studied by wide-awake, aggressive men, it will be worked out in a way to enable buildings of this kind to be made at a very low cost. The blocks would be of such a size that they could be set largely by hand or with a light derrick which could be worked from the inside of the building on the joist, if not on the scaffolding; certainly from scaffolding if made as heavy as in this country. The blocks could be numbered, through which help they could be set by an intelligent bricklayer. LOUIS H. GIBSON.

Paris, January 16, 1891.

The Chinese Government has decided to establish brickyards in the empire in order to rebuild most of the cities whose houses are constructed almost wholly of wood. The frequent fires in these places almost invariably results in the destruction of thousands of buildings.

Written for the Clay-Worker.

HINTS ON BRICKMAKING.

No. 53.

BY "R. BRICK."

"BURNING ADVICE."

AFTER the question of drying the product of your works has been determined, a process of burning your bricks must be "settled." The old process, viz.: Placing the fuel immediately under the ware where it is exposed to sudden change of temperature from a low to a high degree and "vice versa," the coal or wood coming in contact with the bricks, a temporary, thin wall with innumerable seams for entrance of cold air. It would seem that in this era of improvement and National Brick Manufacturers Association, unnecessary to discuss the question as to whether or not a brick manufacturer should use the old-style kilns or process of burning. The question ought to be, which of the improved methods are best, most economical, most profitable? Here, again, comes in circumstances, conditions, quality of clay, kind of brick manufactured, fuel to be used and other conditions.

Let us see what shall be expected of an improved kiln. It ought to burn successfully and economically the following fuels if it expects to come into general use: Wood, coke, coal, coal-screenings, oil, natural gas or fuel gas. The labor of firing should not exceed one fireman for each two hundred thousand bricks burning. The operation should be so plain that any laboring man of ordinary intelligence and judgment can do the firing under the supervision of the Superintendent of the works, who can visit the kilns once each two hours during the day and under the instructions of the night superintendent during the night. Such a kiln should not require that a boss burner must direct each firing of the kiln.

The distribution of heat throughout the entire kiln should be under control of the burner, also the degree of heat in each arch or chamber of the kiln so that the supply is constant and when the required degree of heat is obtained that temperature can be maintained until the ware is finished. The escape of heat must be only so much as is necessary to make draft enough to supply oxygen necessary for proper combustion of the fuel. The walls so far as practicable should be permanent to save building and removing walls at each burning. These are some of the main features that an improved kiln should possess. As to

draft, there are up-draft, down-draft, up and down-draft, horizontal draft, and one absolutely without draft; the latter is economical so far as fuel goes, but if "time is money," it is too costly for brickmakers. Of the up-draft kiln there are two distinct kinds, one with temporary top or "flatting," the other a permanent top or arch or crown top; both are on the same principle. For narrow kilns the arch top is best, for wide kilns the arch top is hardly practicable being difficult to support properly. All down-draft, up and down-draft and horizontal draft kilns necessarily have permanent arched tops. All kilns, however, are alike in one great principle; it is that the heat enters at one part and escapes at another part. Let this vital point be remembered—the heat cannot enter at every point—neither can it escape that way. If this proposition is correct, it follows that the ware must become heated first at the place of entrance, and afterward at place of exit. Then whether the heat enters at the bottom and escapes at the top, or it enters at top and escapes at the bottom, or it enters at one side and makes its exit at the opposite, the ware is first heated at the entrance and later at the exit.

The time required to heat the whole mass of ware must then be dependent on the bulk of same, if the distance from entrance to exit is ten feet, it can be heated in much less time than when the distance is twenty feet. In other words, a kiln containing twenty thousand cubic feet of ware requires more time to acquire a uniform degree of heat throughout than does a kiln containing fifteen hundred feet of ware. In a former article the writer asserted "if the settling heat (that is the degree of heat necessary to finish the same) is applied before the ware is thoroughly heated in every part of the kiln, the result is overburned ware at the part where heat enters and underburned ware at the part where heat escapes.

If heat is applied in degree sufficient to burn or finish the ware before each part is uniformly heated, the result is that the ware where the heat enters is burned enough while the ware at the escape is only half burned. Then in order to finish the whole mass, the ware first heated is damaged or destroyed by too much heat. This may seem unnecessarily tedious, but I am trying to prove that kilns of brick or other clay wares require to properly burn them, length of time in proportion to the bulk of ware to

be heated and burned uniformly. In the January issue a correspondent (or firm), did me the honor to criticise my article, which appeared in the December No. The last sentence says "and thus make one heating and one cooling answer for one kiln." They set up a veritable man of straw and proceed to knock him down. If they will read articles in the CLAY-WORKER under the title of "Hints on Brickmaking," they will see that we agree on this point. They speak also of applying heat rapidly and violently to all parts of the kiln in order to produce a superior ware. Practical brickmakers will, I think, agree with me when I assert that it is not *possible* to apply the same degree of heat *rapidly* and *violently* to all parts of a kiln of bricks of ordinary dimensions.

The burning question will be continued in the May No.

Written for the Clay-Worker.

BRICK PAVEMENTS; HOW PEOPLE LIKE THEM.

BY D. W. STOOKEY.

"EXPERIENCE keeps a dear school, but fools will learn in no other," said Dr. Franklin. Those things learned in Franklin's school are well learned and the testimony rendered from such learning is valuable. While fools will only learn by experience, it does not follow that all who learn in this way belong to this class, but on the contrary, wise men study under this hard teacher. They also learn valuable lessons from the experience of others. When the apostle said: "Prove all things; hold fast that which is good," it is not likely that he meant that each individual should make a personal test of "all things," but that each one should "hold fast" that which has been proved to be good. Neither is it necessary that each city should make tests of its own of all styles and kinds of pavements that have been offered for trial, but each may adopt that which is good according to the proof and testimony of those who have given them fair trials. Testimony of those of experience is a very common and effective way of convincing people of the desirability of the subject under consideration. If testimonials are good in directing public favor towards patent medicines and clayworking machinery, they surely may be used advantageously in introducing brick pavements to the public and thus increasing the sales of brick for paving purposes.

The use of hard burned brick for street

pavements is no new thing, but they have been on trial in various places for years. They have stood well the crucial test of time and have steadily gained in favor as experience has made their qualities better known and taught the better plans for their use. Many testimonials as to their value and the satisfaction they have given have been rendered by persons competent to judge fairly of their merits. We have taken pains and expended considerable time in gathering these opinions and, having arranged them topically as far as possible, will present them trusting that they may prove interesting and profitable to those who may be studying the subject. These are the opinions of City Officials, Civil Engineers, Presidents of Street Railway Companies, Officials of leading manufacturing establishments and prominent citizens and may be considered as valuable as testimonials could well be. Not only are these opinions given by different persons in various avocations, but they have been gathered from many cities scattered through several states of the Union, principally located in the Mississippi valley. The names have been omitted but the writer is prepared to give the author of any quotation and will satisfy the curiosity of any in this particular.

GOOD OPINIONS.

"The public mind is fast being educated to believe that if brick can be burned hard enough and in sufficient quantities, it is the material above all others that should be used for economical street paving in small cities."

The brick manufacturers have successfully solved the problems of hard burning and supplying them in sufficient quantities.

"A good brick pavement is, all things considered, for the greatest number of users, the Best Pavement known at present."

"They are giving the best of satisfaction wherever laid properly."

"The brick pavement is the most desirable as it possesses all the good qualities of the more costly pavements, and none of the objectionable features of most of them."

"At Decatur, Lincoln, Champaign and other large towns in Illinois, they have put down brick pavements on their streets and they are more than meeting expectations."

"When its cheapness, smoothness, durability, cleanliness and ease upon horse flesh are to be considered, it is far su-

perior to granite in every respect and for all kinds of service."

"There is no pavement in the State (Illinois) that presents a finer appearance than the one I refer to."

"After many years of experience in municipal work, I am willing to put myself on record by saying there is no better pavement known to the engineering fraternity than a properly constructed brick pavement that can be made for the same money. It is simple in construction; it is easily, cheaply and quickly repaired."

"It is the smoothest, most durable and economical pavement that can be laid, and from a sanitary standpoint is without objection."

"It presents a very desirable surface and gives universal satisfaction."

"No complaints are brought against the use of brick for pavements, so far as our experience goes."

"They have been in use here for twelve years at least, and give us good and perfect satisfaction."

"I believe it to be the best material now in use for street paving."

"I will say without fear of successful contradiction, that it is the very best now in use."

"Our streets are becoming the admiration of all visitors."

"The first was put down five or six years ago and it is as good to-day as it was the next day after being put down. We are perfectly satisfied with it."

"That this is THE paving material of the future, is the belief of those who have given the subject most thought and who are the closest observers of test pavements which have been put down during the past five to fifteen years."

"There is *no doubt, whatever*, but what brick is the coming pavement."

"The time is undoubtedly near when brick paving will be adopted for the heaviest traffic."

"Upon the question of brick pavements there's but one opinion held; that is unanimous that brick is the best and cheapest pavement in the world."

"We were told that the brick pavement was so satisfactory there (Steubenville, Ohio), that the people could not be induced to use anything else."

"I do not think Burlington will lay

any more granite in the near future as our citizens are all decidedly in favor of brick."

"One man said that if any other material for paving was used he, would dispose of his property and locate on another street. Nothing but brick would go with him. Others were equally as decided."

"We have tried stone blocks, Nicholson and Macadam pavements and still have samples of each from which to draw our conclusions, but the citizens of Bloomington are a unit in favor of brick for future street pavements."

It is easy to believe and understand



RICHARD SMITH, OMAHA, NEB.,
Vice President National Brick Manufacturers' Association.

that brick will make a smooth and beautiful pavement but very many have been, and are yet, skeptical as to their durability. We find abundant and convincing testimony as to its durability given by the same classes of people who praise its other excellent qualities. The following are a few of the many that might be given.

"In Bloomington, Galesburg, Jacksonville, Chicago and Peoria brick pavements have been laid which already show remarkable qualities of endurance. Some of these pavements although laid ten years ago, present at the present time not only a uniform but very

smooth surface. This fact taken in connection with the additional one that no repairs worth mentioning have been made on these pavements during all these years, speak volumes for the pavement under consideration."

"Samples of brick which have been in service in pavements in Bloomington fourteen years—some nine years—the wear is immaterial, not over half an inch in ten to fourteen years."

"Some brick pavement in St. Louis that had been down two years on Pine Street and subjected to the severest wear and the wear does not exceed one-sixteenth inch per year."

"The oldest brick pavement in the city (Galesburg), was put down four years ago. * * * This brick pavement seems to be very fine and shows no signs of wear."

"Brick is the best for a permanent pavement."

"This one has been down for ten years. It has been used along the curb for hack stands day and night, and is not much worn and where worn at all, it has worn evenly."

"I saw that pavement put down and have watched it for fourteen years from a civil engineer's standpoint. After twelve years' use this pavement was absolutely as good as when first put down * * * and it makes the best pavement I ever saw."

"At Quincy, Ill., parties drove a circus, a steam calliope and other heavy vehicles over it. They also ran a steam motor with enormous flanges over it and the pavement was not phased in the least."

"The wear of eight years was hardly perceptible."

"In the Netherlands the highways are generally paved with brick. * * * Some of the highways have been paved for more than half a century and they require little repair and make splendid roads to travel over."

"A good, vitrified clay block is indestructible so far as heat, cold, moisture, dryness, weather and time itself are concerned."

"A vitrified block of clay will stand a greater test-crushing weight than an equal sized piece of granite."

"Manufacturers claim that clay properly annealed will outlast granite."

"A prominent fire clay manufacturer offered one of our street car companies to put down between the rails vitrified

blocks adjoining granite and if not outlasting granite, not to charge a cent for same."

The persons who expressed these opinions had evidently given the subject much thought and were familiar with the different pavements of which they spoke. Surely they are pleased and satisfied with brick pavements.

"We have gathered posies from other men's flowers,
While only the thread that binds them is ours."

Yet we trust that the "posies" will be pleasing and since the flowers were sweeter and brighter than those that grew in our own garden we offer this as an excuse for lack of originality.

BURNING BRICK WITH CRUDE OIL IN CHICAGO.

BY C. S. PURINGTON.

NOTWITHSTANDING our firm was one of the first to undertake so radical an innovation in the method of burning brick and that since the change we have burnt many millions with oil as fuel, I feel that I can say little that will prove interesting or that will be worthy of attention. My experience has been mostly confined to our own works and, therefore, trust I may be pardoned if I dwell too long upon personal experiences so far as they pertain to this subject. After locating our works at Dalton, I found that although our clay would make excellent brick that it was of such a nature as to require more wood and coal to burn than was warranted by the prevailing price of brick and furthermore there was a great difficulty in getting uniform burns and then it was that we determined on a change and commenced the use of crude oil. Our first experiments proving successful, we have used no other fuel "except on our steam shovel" for the past three years.

My brother, D. V. Purington, of the Purington-Kimbell Brick Co. of Chicago, commenced experimenting with crude oil simultaneously with us and our joint experiences resulted in adopting the oil burning method now in vogue in this city. So far, neither of us have regretted the change and it has added so much to the comfort of conducting the business that we would be very loth to discontinue its use. Our kilns open up with such uniform good results that there is no lying awake nights worrying over bad brick by reason of bad burns. In fact, that part of our business moves along so smoothly that during an entire season's

work I never give it a thought. And now of the practical points. I find that the cost of coal and oil under boilers are about the same, but there is this advantage in oil over coal, viz.: We can maintain a constant pressure at any desired degree for hours at a time, therefore insuring a steady output of brick from our machines and, as a consequence, a greater daily average of brick made.

In conversation with manufacturers of other products, I learn that this increase of daily average product has been attained by the use of oil and we may, therefore, say that indirectly the use of oil under steam boilers is more economical than coal. In burning brick I find that my saving over wood and coal is considerable, but the principal point of advantage is the saving of labor in handling the fuel. As you all know, that after your wood and coal reaches the yard, that to cut and carry them around the premises is a large item of expense and there is no way to avoid this expense, no matter how you may arrange your yard. How different with oil. It is stored in tanks from which pipes lead to boilers and kilns and in order to get it to any desired place you turn a valve and in a moment have your fuel at hand. Then, again, you save labor around the kiln, as not so many men are required to handle the fuel. My experience has been that men, by the very nature of the business, principally through loss of sleep, are prone to do as little as possible for their daily hire around a burning kiln. But they find that oil burning is so little tax on their physical powers that they are always ready to look after their employers' interests and in three years experience I cannot recall any dereliction of duty on the part of my kiln men.

I must not forget to mention one or two other items of expense we avoid, viz.: The deterioration in grates and the hauling away of ashes. With oil no grates are required, and as there is complete combustion there are no ashes. There seems to be no wear on the appliances with which we handle the oil. Our burners and pipes are as good as they were three years ago. I wish to add here that in my opinion, the damage to boilers under which oil is used as fuel is very much less than to those using coal. I know that coal men claim differently, but their statements are not warranted by facts.

Now as to the quality of brick, the oil burnt brick are uniformly as good as the

best burned by coal and wood. I have a vivid recollection of my old coal and wood days when a kiln would be finished that bore every external evidence of being first-class, but how great would be my disappointment when I would open it up and find a big pale spot in one place, and perhaps several carloads of stuck brick in another. It was enough to try the patience of a saint. In the year just passed, I have burned twenty-eight million of brick and I can truthfully say there were not five thousand pale or lammy brick. You may ask why this uniformity of good brick. It lies simply in the fact that at all times the burner has perfect control over his fire, regulating its intensity and directing it to any desired spot and at all times being able to increase the draught. In short, the burner at every point is master of the situation. I am aware that the best results so far attained in burning with oil have been where they burn directly under the steam and when they let the fire follow closely after the steam. Why this is so I am not able to say, as I have had no personal experience with other than our own clay which is burned directly under the steam. The principal failures have been in burning brick that require the water-smoke to be entirely taken off before heavy firing is commenced, but my opinion is that there is no difficulty of this kind but can be overcome by careful and watchful experiment.

My brother, D. V. Purington, has successfully burned pressed brick at Porter, Ind., and I know that he overcame this difficulty and will be pleased to give his experience in that direction and tell how he burned many millions of beautiful pressed brick with oil.

A year or two ago, the Tiffany Pressed Brick Co. of Chicago, made a failure of burning their brick with oil, the cause of the failure being their inability to burn after the water-smoke was taken off, but during the past year they made further experiments and were so successful that they have adopted oil permanently, and they are now delivering a very fine quality of pressed brick into the Chicago market.

Failures have been made at Minneapolis and Milwaukee, but in each case, although the brick burnt with oil were sold at the market price, they discontinued its use when, if they had only burned two or three kilns more they could, in my opinion, have overcome the difficulty of the first kiln and made a complete

success. If any of you contemplate the adoption of oil and should make the experiment, don't be discouraged by your first effort. There is no obstacle but in my opinion can be overcome, and when success is attained the profit and pleasure of its use will be such as to pay you for any inconveniences you may have experienced at the start.

We use steam for atomizing our oil. There are some who use air furnished under pressure. As to which is the best, I am unable to say as my experience has been wholly with steam.

I feel that we are still far from proficient in the use of oil as fuel and it is only by comparing our several experiences that we can arrive at results entirely satisfactory. Nine of the largest Chicago yards with a total yearly capacity of two hundred millions, have adopted oil as a fuel and I am assured by the proprietors that so long as the price of crude oil continues reasonable they will continue in its use. Of course when the supply of fuel decreases and the cost advances materially over the present market price, we will have to adopt some other method, but it is my opinion we will go to gas and we will manufacture the gas right at our works. To go back to coal and wood in a crude state would be retrograding. This is an age of progress and after one step forward I, for my part, don't care to go backwards. I predict that in the next decade very many of our craftsmen will be burning their brick with artificial gas. Some of you, no doubt, use natural gas, but experience shows that natural gas as well as oil, will steadily exhaust, and I am sure you will not care to go back to coal, so there will be no alternative than to adopt artificial gas. There are now cheap methods of manufacturing gas and I think there is no doubt but it could be successfully adopted by clayworkers to whom oil and natural gas are not accessible.

If our readers will simply write the words "CLAY-WORKER" on the margin of their letters when writing to our advertisers for circulars, etc., they will confer a favor both on us and the advertiser. The latter is anxious to know the source of the inquiry and the words "CLAY-WORKER" will tell the whole story.

Written for the Clay-Worker.

SETTING AND BURNING.

BY H. BRIX.

THE aim of a brick burner should be, to secure uniform results; not in a single kiln of bricks, burned so that it will turn out 90 per cent. hard brick of a good average color, and the next kiln burned a pronounced light red or salmon color, followed by another part light and part dark red in color, but uniform in hardness and color from mouth to mouth, and a standard degree and shade established as a "trade mark" for the firm and continued so.



FRANK B. MCAVOY, PHILADELPHIA, PA.
Treasurer National Brick Manufacturers' Association.

The subject of brick burning is so closely related to that of setting, it is difficult to talk of burning or attempt to show how it should be done, without referring to the setting.

When one examines the setting closely on a hundred different brickyards, he will wonder how the fire could be expected to get through and among the bricks sufficient to burn them as hard as required.

It is no unusual sight when a kiln is opened to find that the fire has found an outlet very free at two or three points in the kiln; at these places there will be a sort of pyramidal pile of hard bricks, in

the midst of a great pile of inferior salmon bricks.

This outlet for draft is usually about the middle of the kiln. There are two reasons for this: First, the natural course of the heat towards the center, which is augmented by the fires on opposite sides. Second, when two setters are at work on opposite sides of a kiln, they work from the outside towards the center; at that point the work is usually left in an open or loose condition where the spaces are either too long or too short for a brick's length to complete the work.

These places form flues for the fire, and the heat seeks an outlet where the draft is strongest. I have noticed also, that where I had three, four or five setters at work at one time on the same kiln, when I burned the kiln I could tell where the careless setter had worked. I settled this matter to my satisfaction in this way: The setters took up their position in the kiln day after day in about the same place, and when I came to raise heat I found that the fire came up well on one wall and badly on the other. Thinking that perhaps the fault might be with the firemen, as each took his side of the kiln and fired continuously for twelve hours, I changed them to the opposite side. Then, again, I changed them every six hours, but the trouble was still there—that side was behind. I was observing the setters in the meantime, and had made some changes, and began to suspect the cause and soon found it. It came about in this way: The setter whose place was on that side was absent from the work and another took his place and I had no further trouble in that respect afterwards.

It was the careless manner of setting that made the draft irregular, and when the heat got behind on the start it remained behind and there was no remedy as the strong draft carried it away from the point where it was most needed and brought in cold air at that point to support combustion at that point where the heat was the strongest.

The main point is to have a regular and uniform method of setting and do not vary from that. Keep to the one well established rule of free fire space on all sides. If the brick are crowded too close, there is danger of soot adhering to the brick at the top of the kiln

during the sweating or water-smoking, and then the heat finds an outlet and rushes to that point, and the soot acting as a non-conductor keeps the kiln from getting hot and delays the time of burning and the fire can only be waited on to burn out the soot by radiated heat instead of direct draft, as it can neither be forced or coaxed to the cooler places. Put your platting on with good, whole bricks and laid in such manner that it can be pushed together and tightened at any time during the burn. Then if the heat shows that it is escaping too freely at any point, the platting can be closed and the heat scattered and radiated to other cooler places. If there is no draft and the platting is too tight, it is well enough some times to force the platting aside and give vent. If the flames are even all over the top of kiln and show at every corner of the platting when the fires are freshened, the kiln is doing well, but if the flame is escaping in tongues a foot or more in height, take some measure to prevent it. If it is a large crack in the kiln caused by the shrinkage, better fill it with old brickbats and cover with clay than allow it to remain, as I have seen burners do.

AS OTHERS SEE US.

T. A. Randall & Co.:

DEAR SIRs—Please find draft enclosed to pay for the CLAY-WORKER to December, 1891. As it is an indispensable work with us, so long as it is published and we can raise the money to pay for it.

Ottawa. Kan. POLLOCK & BALDWIN.

T. A. Randall & Co.:

DEAR SIRs—We received your statement and herewith enclose pay for the CLAY-WORKER to December, 1891. It is the best work of the kind by all odds, that we have ever seen, could not get along without it, and freely send the increase of same. Wishing you success in the future, we are,

GAINESVILLE (TEX.) PRESS BRICK CO.

T. A. Randall & Co.:

GENTS—The CLAY-WORKER has been read with both pleasure and profit to me, and I quite agree with you as to the theory on which the price is advanced. If such a publication is not worth \$2.00 a year to a brickmaker, it is certainly worth nothing.

I take pleasure in enclosing \$2.00 for our subscription to December, 1891.

SERGEANT BLUFF & SIOUX CITY B. CO.,
G. H. BROWN, *Manager.*

Written for the Clay-Worker.

THE FUEL QUESTION

No. 6.

LIGHT AND HEAVY FIRING, ETC.

DEAR WILL:—Much may be said on the subject of firing; much has already been said, and well said too, yet, it is no worn out, or even threadbare subject; it is yet full of interest to the intelligent and studiously inclined fireman, whose duties I have presumed, are not so severe and laborious, that they overtax his physical powers, and cause all mental exercises to be absorbed in the desire for bodily rest. Such a state of things not being compatible with modern ideas of the requirements from firemen. On the assumption, however, that our firemen's physical powers are but moderately drawn on, we may draw the inference that his mind is in condition to grapple with the scientific portion of his calling; and circumscribed and dirty as his duties may appear, he has a vast and fertile field open before him. The fuel which he so unceremoniously throws into the furnace, and the air which he admits to burn the fuel, each contain within themselves worlds of wonders, and which they are always ready to reveal to the earnest searcher who has provided himself with Nature's Guide, and catalogue. Unless your mind is stored with these, your search will be vain, and result in nothing but an empty wish.

That misshapen and unsightly piece of coal at the fireman's feet when examined in the light of chemistry, is, literally, "A thing of beauty, and a joy forever," it also contains within itself an immense geological interest; and who would suspect that harmless looking lump to be possessed of such prodigious energy or power.

As this last is the quality in which we are at present interested, we will proceed in the examination of coal burning to see how this innocent looking mineral affords us so much power.

From repeated remarks I have heard you make, I know you attribute this power to a quality in the water, by its change, or increase in size, in becoming converted into steam; true, this enlargement of about 1,700 times in bulk now contains the power or energy, but a short time ago it resided in the coal, and the water has become possessor by a transference only.

Now, when coal, or in fact any fuel, suffers decomposition by burning, it gives

up, or transfers to some other body, its mysterious *quality* which we call *heat*, and what was fuel a short time ago, is now gone into the atmosphere as so much carbonic acid and water vapor, and they are no longer in the category of fuels, but the very opposite, as I have told you before, *they are the two best agents we know for quenching fire.* I want you to think this paragraph well over, as I shall refer to it again when I write you on water gas.

Steam, then, is only the carrier and distributor of this power and the consumption of a certain quantity of fuel is only another way of stating the liberation of a certain amount of power, and no matter how, or where, this fuel is burnt, the same amount of power is liberated and transferred to something else. The burning of one pound of carbon under a boiler, in a brick kiln, lime kiln, or parlor grate in the period of one minute, generates a power equal to 339 horses; if this energy were expended in raising a ton weight, would raise it over one mile high. This, then, represents the energy of one pound carbon in burning to carbonic acid; and no matter how quickly or how slowly the burning takes place, the *total energy* is just the same. If you take an hour to burn one pound carbon, you will develop 5.65 horse-power for the whole period and you will easily perceive that 5.65 horses working 60 minutes is equal to 339 working one minute. Accepting the above for the present, you may get a tolerably clear idea of the power you are not getting out of your fuel, which will no doubt astonish you a little.

This is somewhat a digression from the text, but would like to maintain your interest in these letters, and I therefore lead, as it were, to the top of the mountain, so that you may get glimpses of the *wonderful* surroundings in every direction, and to impress you as much as I can with the grandeur of the subject, and to increase your desire to grasp as much of it as you can. In a future letter I will tell you how the energy of fuel is arrived at, that is, the measurement of its energy.

By applying a little arithmetic, you will be surprised to find that the 10 tons of coal consumed under your boilers in 24 hours, gives out the energy of over 4,900 h. p., whereas your engine is rated at 160 h. p. Now I know you will be very slow to admit, that for every 100 h. p. your fuel gives out, you only use $3\frac{1}{2}$ h. p., yet such is really a fact. I can readily excuse your hesitancy to accept

this, and I have no doubt when this appears in print many will be ready to join you in rejecting it as a wild and unfounded statement. I am tempted, however to venture on another of these apparently unfounded statements; this is for the benefit and amusement of the young brick manufacturers, who look upon heat as simply *high temperature*, and have not accustomed themselves to consider it anything but a very convenient thing to burn bricks with. Energy, or power, has scarcely ever entered their heads, they will therefore be ready to ridicule the idea, that the energy developed by the 50 tons of coal used in burning a kiln of bricks would, if expended in lifting equally all over, under the kiln, raise it and its contents, say 200,000 bricks, or 600 tons, to a height of 176½ miles! If this kiln consumed its 50 tons of coal in six days, and the energy all expended in raising the kiln, instead of burning the bricks, the kiln would have an upward velocity of 108 feet per minute!

Now, to my young friends who may think I am trying to play on their credulity—and there are no doubt old ones too, in the same mind—to these I would say, they cannot be more sceptical about this doctrine than I was, and would here remind you that I am not propounding to you any newly supposed theory, wanting proof, but a practical, demonstrated fact, in every day use, and has been for years. I set up no claim for discovery in this matter, I am simply telling you in my way, a plain truth that has been told to me, and its proof rests in our ability to deal with the question.

I will now take up the question of "Light and Heavy Firing," otherwise this paper will be misnamed, or be all *et cetera*.

It is now generally conceded that light firing will give the best results where heat and the maintenance of a uniform

temperature, are the only objects sought. I have in my letter No. 4, "Draft, Ashes, Clinkers, Etc.," pointed out how easily draft may be almost cut off, by a heavy charge of small coal, but this is not all, the mischief does not end in simply sealing up the air passages through the grate and fire, it further obstructs draft by lowering the temperature of the furnace, and hence the temperature of the waste gases ascending the chimney. For an ocular demonstration of diminished draft by heavy firing, place yourself in sight of your smokestack, and observe the velocity of the smoke leaving the top, while your fireman puts on a heavy fire. The smoke from the first two or three shovelfuls of coal put on is rather

at the top of the chimney, and may be watched with considerable interest. A notable increase in the velocity of the smoke will be observed, immediately after the upheaval of the fire with the slice bar; these upheavals of the heavy fire, open up-draft channels through the grate, and the incoming air ignites large jets of liberated gas, giving out much heat and as a natural consequence increases the velocity of the smoke. A pretty fair idea of the condition of a furnace may be arrived at, by a systematic observance of the smoke escaping from the chimney, when bituminous coal is used.

The *rationale* of soft, or bituminous coal burning are simple, and easily observed, and may be stated thus: First, the distillation of coal gas, or the hydro-carbons; second, the oxidation of the carbonaceous matter, or coke remaining after the distilling process. When a furnace is just charged with coal there is, for a short period, a considerable reduction in the temperature of the fire; this heat is absorbed by the fresh coals in order to raise them to the same temperature as the fire; when they have been



THE CLAY-WORKER SANCTUM.

thin, and leaves the top of the stack with a high velocity; each succeeding shovelful raises thicker, blacker smoke, and reduces the speed of the escaping smoke, and by the time the heavy firing is finished, the smoke rolls out at the top with a much reduced speed and thoroughly blackened. I am assuming of course that the firing is done with bituminous coal.

We have not much difficulty in arriving at the cause of this diminished draft, it has already been stated above. I may observe, however, that this diminished draft will remain slow and tardy until the furnace begins to recover, and regain its former temperature, the stages of recovery will also manifest themselves

heated up to about 800° or 900° F. the distillation of coal gas becomes very vigorous and the gas will ignite, if the furnace is not cooled below 900°, and there is a sufficiency of air to combine with it; this combination produces much *high temperature* heat; I say high temperature heat, because, it is possible for a large quantity of heat at a low temperature.

If the above conditions are wanting, viz., air and temperature, the gas escapes up the chimney unconsumed. The carbonaceous matter of the coal is ignited by the heat of the burning gaseous matter, and commences burning when it is deprived of its gaseous portion, its point of ignition is somewhat higher than that

of its gas, depending on its density; the higher the density the higher is its igniting point, and *vice versa*. We all know how much easier it is to kindle a charcoal fire, than one of anthracite; a similar comparison may be made with the gas house coke, and coke made in coke ovens, the difference is not so wide, but quite perceptible. From considerations set forth in the *rationale* of soft coal burning, one cannot very well reach any other conclusion than the one advocated at the beginning of this letter, viz., light firing, as being best adapted to meet the requirements where a high and uniform temperature are what is needed.

Now to the mere coal shoveler, whose knowledge is limited to what has been furnished by his five senses, these letters are but senseless jargon; to you they are something more, and to firemen generally, especially those who are not satisfied with a superficial glance at Nature's laws, for on these laws we can safely rely in all our arts and manufactures.

Now, let us consider thick firebeds and heavy firing. In all my reading, and in all my experience I have never seen any set of conditions where these were absolutely necessary, except in "banking" fires for the night, in cases where machinery was not run during the night. I may also except gas producers for thick firebeds, I cannot at present recall any other exceptions. The gas producer I need scarcely explain is not for the generation of heat direct, but for the generation of gas, to be used in another furnace where heat is wanted.

The evils set forth above when treating on light firing are equally objectionable in this part of the subject, but in showing up the mere fact of impeded draft and reduction of temperature I leave out the most mischievous portion of my charge.

I have shown in a former letter that a thick bed of fire on the grate is conducive to the production of carbonic oxide—in fact, this is the very object aimed at in having a thick firebed in a gas producer, and this is one of the gases produced. I have also repeatedly shown in former letters, the great waste in allowing this gas to escape unburnt.

It may not be inopportune here to say a few words about the functions of a combustion chamber, this, in all cases, should be roomy.

A very prevalent idea with advocates of thick firebeds on the grate is that the nearer the fire is to the boiler the more steam it will make, and with this end in

view I have frequently seen fires piled up within four or five inches of the boiler shell; now this is all very wrong, and due of course to ignorance of the laws of combustion, and the requirements of a combustion chamber. Less than thirty years ago it was a common practice to set a boiler only 16 or 18 inches above the grate, and put 9 or 10 inches, and sometimes more, fuel on the grate. Now it is common enough to see that height doubled and the fuel little more than half that thickness. Why is this? Because engineers begin to recognize that in order for combustion to take place perfectly, it must have room for the expansion and development of flame, especially so with bituminous coal. Cold surfaces cool and quench flame, and the shell and tubes of a boiler in safe condition are but little hotter than the water and steam inside the boiler, consequently, they have a very cooling effect on the flame in contact with them, and the flame needs full development and strength to stand such a check. This, I think, will be sufficient to show you how indispensable it is to have a roomy combustion chamber or space over the grate.

Then, as to the evils of heavy firing; by this I mean large charges of coal put into the furnace at long intervals. In addition to the evils of a thick firebed, as shown above,—which must necessarily result from heavy charges, or from light ones too frequently given—there is the objectionable feature of the furnace door being open much longer periods; true, not so often, but double the times, and halve the periods, is much better in every respect, avoiding by this means the *extremes* of temperature.

In the first portion of this letter I have endeavored to show you the enormous power of heat; now let us see what practical bearing it has on heavy firing. A charge of coal—say 250 to 300 pounds, not an uncommon thing—on a moderate sized grate, will of itself cause a great reduction of temperature, and this damaging effect is further aided by the admission of 60 to 80 pounds of cold air through the open furnace doors. If the reduction of temperature in the boiler shell only amounts to 12° or 15° F. the contracting strain is about 2,000 pounds per square inch of section, and in regaining its former temperature the same amount of strain is exerted in expansion, these strains are confined chiefly to the underside of the boiler, and on this account are more destructive, and sooner

or later the services of the boiler maker are required if nothing more serious occurs.

This chilling and heating also plays havoc with furnace walls, and in fact everything within the range of its influence. A sudden chill will do more damage to furnace walls than months of wear by a high but steady temperature, this applies equally to any kind of furnace, or kiln, and from what I have seen of its destructive action on fire bricks in heating and melting furnaces, I conclude it must be the cause of thousands of spoiled bricks in the brick kiln. Sudden heating and sudden cooling are in themselves, each a source of mischief, but when both are systematically repeated, what may we expect but increased damage?

Before closing this letter, I wish to call your attention to a poor system of grate cleaning which I saw at your establishment and have seen at other places, too. I refer to the system of pushing the fire back to the bridge and cleaning the front portion of the grate, then drawing the fire forward on the cleaned portion and cleaning, or attempting to clean, the back portion. I have seen it much better done by moving the fire to one side and cleaning, say, half the grate right back to the bridge and afterwards moving the fire over on the cleaned portion, and cleaning the other half. The front and back method is not convenient for in cleaning the back portion, the clinkers have to be raked over the piled up fire in front and always leaves small clinkers and ashes on the fire, besides dragging out live coals with the clinkers. A few trials of the side to side method will soon convince you of its superiority in giving you a cleaner grate with less trouble. I must also enter my protest against another pernicious practice; that of stopping during a firing to talk, with the furnace doors wide open. A scrupulous and intelligent fireman cannot be induced to do this; he will either close the doors, or feign deaf and dumb, until the charge is finished, no matter who attempts to draw him into conversation.

In looking over some back numbers I came across a paragraph or two which may not be out of place here, even if you have read them before, for I think they will bear repeating; they are from *The Safety Valve*, a capital monthly journal devoted to general engineering, but chiefly to steam motors.

"ECONOMY AT THE FURNACE DOOR.

"The best engineer in Christendom

cannot produce the best results with his plant when he has to depend upon an unskillful fireman, or upon himself, acting also as fireman. It is a common notion that anybody can shovel coal into a furnace, and that this constitutes all that a fireman needs to do. A great many mill agents, treasurers, to say nothing of boards of directors, cherish the idea, without realizing how serious it is. We assert that no man ought to be placed in charge of a coal pile who cannot tell approximately how much can be deduced from it, because it represents a certain number of foot pounds of work, and has, therefore, a definite evaporative value. To speak plain, the coal pile means just so many dollars worth of work. The duty of expending this money, this raw material, should be entrusted to a well-experienced and well-paid fireman. Every engineer has his own specific sphere of work, and only false economy demands that he should move out of it. Engineers are neither omniscient nor omnipresent, but if they know their business, and are not afraid to tell the truth, they will not hesitate to recognize and to condemn the wastefulness of the policy of hiring either a cheap fireman or no fireman at all." * *

PRACTICAL ELECTRICITY.

"MANAGING FIRES."

"The furnaces should be regularly fired at intervals of from 10 to 15 minutes, to avoid making a great change of temperature, which always occurs when a large mass of coal is thrown in at one time, due to heat becoming absorbed in the evolution of the gases. And for the same reason it is best to fire on one side of a wide furnace at a time. The several furnaces of a battery, or of a range of boilers, should be worked in rotation, and the coaling and working of the fires should be done as quickly as possible in order to allow the influx of no more cold air than can be avoided.

"When using bituminous coal, with a rapid rate of combustion, the fire should be from 8 to 10 inches in thickness, but if the combustion is slow, a thickness of 5 or 6 inches is sufficient, care being taken to prevent the fuel from burning into holes.

"With anthracite coal the fires should be kept as thin as possible, from 4 to 7 inches being the usual limits, dependent on the size of the lumps, which should be as uniform as possible, and also open the strength of the draught.

"Different kinds of coal require different modes of treatment in a furnace, and

the best method of handling each is determined by experience only."

The conclusions to be drawn from this letter then are, that light firing at short intervals is preferable to heavy firing at long intervals, that side to side grate cleaning is preferable to front and back cleaning.

That it is imprudent policy to engage a person as fireman at a cheap rate, whose only merit rests on his ability to waste your fuel, and destroy your machinery. I wish to say in passing that the brick manufacturers have shown commendable judgment in employing men to burn their bricks, and in paying them for their skill too. The fireman in charge of a battery of boilers has quite as heavy a responsibility as a brick burner, and a more dangerous vocation, while both ought to be strictly sober, conscientious, and highly intelligent men.

I can confirm the statement given above concerning the notion of mill agents, treasurers, boards of directors, etc., with scores of instances of that kind but I have never yet come in contact with the brick manufacturer who would entrust the burning of a kiln of bricks to the first lout that came along.

Don't let the power of heat disturb your balance, you will find the subject well worth your serious attention.

Yours Paternally,

HYDRO-CARBON.

Origin of a Popular Craze.

Mr. A. Q. Keasbey purchased a farm near Perth Amboy a score of years ago, and to-day about sixty acres of it are spread over New York City. In other words bricks made out of clay from the farm have been largely used in the metropolis, and especially in the new *World* building. Two of Mr. Keasbey's sons are interested in the manufacture of the bricks. Not long ago some buff bricks got a mottled appearance at their kilns and were regarded as badly damaged. One day an architect chanced to see them and they caught his fancy. He ordered a lot of them, and now mottled buff bricks are admired, and the kilns which first produced them by accident have turned out more in response to the demand for them.—*Newark (N. J.) Sunday Call*.

The Council Committee at Sullivan, Ind., have resolved to have about a mile of streets paved with brick this year, if made at home. Excellent surface and semi-fire clays at that place will make

it a desirable location for a paving brick plant. For particulars address Geo. S. Pollock.

NEW INVENTIONS.

The following is a list of patents appertaining to brick, tile, terra-cotta, sewer pipe, pottery, etc., and the machinery used in their manufacture, issued since our last number.

- 444,628. Apparatus for Moulding Patterns on Hollow Brick, Tiles, etc.—Robt. M. Downie, New Brighton, Pa.
- 445,595. Brick Kiln—Thomas Gamon, Philadelphia, Pa.
- 445,732. Brick Press—Carrick P. Oldham, Knoxville, Tenn.
- 445,939. Brickyard Plant—Thomas J. Monk, Gibsland, La.
- 446,064. Brick Machine—Collier V. Heminway, Wellington, Ohio.
- 446,338. Cutting Table for Brick or Tile Machines—J. A. & F. E. Frey Bucyrus, Ohio.
- 446,460. Flower Pot—Harrison H. McElhiney, Nebraska City, Neb.
- 446,877. Composition for Coating Bricks—John Miller, Cincinnati, Ohio.
- 447,151. Brick Kiln—John P. Griswold, Zanesville, Ohio.
- 447,459. Feeding Apparatus for use in Burning Clay—H. G. Butler and Wm. Butler, Kenosha, Wis.
- 447,459. Feeding Apparatus for use in Burning Clay—H. G. Butler, Kenosha, Wis.
- 447,612. Paving Brick—Aethelstan O. Jones, Zanesville, Ohio.
- 447,949. Brick Machine—Jos. A. Frazier & Wm. A. Milam, Corrona, Mass.
- 447,973. Manufacture of Bricks—Ernest L. Ransome, San Francisco, Cal.
- 448,053. Automatic Wire Cleaner for Brick or Tile Machines—Gustav Kukenthal, Berlin, Germany.
- 448,179. Coating Compound for Brick Work—Jerome L. Cross, Springfield, Mass.
- 448,231. Connecting Rod for Brick Machines—Wm. H. Hall, Tiffin, Ohio.
- 448,333. Brick Kiln—John E. Gamble, East Liverpool, Ohio.
- 449,089. Machine for the Manufacture of Bricks and Briquets—Ninian Proctor and others, Leeds, England.

The Dearest Feature.

Unto the daughter and her beau
A courtship's very dear. Alas!
'Tis dearer to her father, though.
He has to settle for the gas.

CORRESPONDENCE.

THESE COLUMNS ARE OPEN TO ALL. THE FULL NAME AND ADDRESS IS REQUIRED BUT WILL NOT BE PUBLISHED EXCEPT WHEN PERMISSION IS GIVEN BY CORRESPONDENT. THOSE DESIRING TO COMMUNICATE PRIVATELY WITH ANY CORRESPONDENT WHOSE FULL NAME IS NOT GIVEN CAN DO SO BY ADDRESSING LETTERS CARE OF CLAY-WORKER.

Burning Dry Press Brick.

Editor Clay-Worker:

Since the convention I have received several letters from fellow craftsmen, who read my article in your paper, and asked for information on a few points. As there may be others who were misled or did not understand the points taken, I ask your indulgence for a few explanatory remarks in your columns.

1st. In regard to stoppers; some wanted to know what I meant by that term and of what use they were. In answer, would say that every four or six brick in the tight (unburnt) course on the top of kiln, we take out a brick, thus making a small flue to draw the heat and allow watersmoke to escape. After the watersmoke has left the kiln and the heat is at the top, we then close up these holes or flues with brick, which we call "stoppers." In this way the heat is kept in the kiln longer and does more effective work.

2nd. The term "flashing" did not appear clear to some. By "flashing," we mean a black or sooty mark on the brick, which is caused by bad setting and clay being used too soon from the bank.

3rd. What did I mean by "holding watersmoke at the top," and later on, "using more stoppers?"

Well, I will admit the two terms do seem in conflict. What I meant to imply was, that when the watersmoke is out of bottom of kiln and collected at the top (in burning press brick) we hold the fire at the same heat, so as not to rush the watersmoke off the top too fast. The phrase was used simply for want of a better one.

The idea of having more stoppers in press brick kiln is to prevent too many variegated brick. It is obvious that the fire will run to the stopper (following the draft) and the end of brick nearest the opening will be burnt dark while end furthest away will be light and this is true for three or four courses from the top.

Ergo: More stoppers lessens the number of such brick in a kiln.

We have been asked for our experience in drying dry press brick before setting in kiln. We have had none yet, but believe it depends in a great measure

upon the clay. Of course it is cheaper and there is less handling of brick, when the clay will admit of being set direct in kiln from the machine. Hope I have made myself clearly understood.

Coaldale, Ala. JOHN W. SIBLEY.

. Dry Press Pavers.

Editor Clay-Worker:

While on a "sight seeing tour" homeward, I "dropped in on" the Williamsport Brick Co., of Williamsport, Pa., and found them to have a really model plant. They are operating the Whittaker Semi-Dry Pressed Brick Machines and burning in the Guthrie Continuous Kiln, the principles of which were so ably expounded by Mr. Lovejoy at our late Convention. They are making bricks, which for color, ring and shape, I have never seen surpassed. Their material is a "red rocky shale"—vitriifiable—which makes not only a very fine front face brick, but also a very excellent quality of paving bricks. The clay is brought to the works from a distance of about 10 miles, and dumped into large bins from the Company's side track. It is then ground in a 9-foot dry grinding pan, made by Fisher, of Pittsburgh, Pa., elevated to the top of inclined screens, thence down to machine and then to kiln. From the pan until the green bricks are put on the barrows, the process is entirely automatic. This company has been in operation less than a year, but are already making rapid strides for the front rank of brick manufacturers. Mr. F. Reading is the Company's general manager, and a more courteous gentleman it has not been my pleasure to meet. I hope to repeat the Convention dose of "brick dust" next year, and to renew the many pleasant and profitable acquaintances made at Indianapolis. The general tone of the meeting was "Ask and ye shall receive."

SATISFIED.

Whence the Balance.

Editor Clay-Worker:

I send you copy of the Catalogue of the Akron Roofing Tile Works. By comparing the matter on pages 2 and 3 of same with the leading article in the March 15th issue of your Chicago contemporary (pages 5 and 6) under the head "From Our Editor," you will find that that worthy is at his old tricks again—appropriating the work of others without credit. Such pilfering is shameful. I wonder where he found the rest

of the matter for his heavy editorial (?). Hoping you will expose the fraud, and, wishing you continued success, I am

Sincerely, JUSTICE.

Akron, O., March 20th, '91.

THE DEADLY PARALLEL.

FROM AKRON ROOFING
TILE WORKS CATALOGUE.

FROM THE BRICKMAKER,
MARCH 15TH, '91.

ROOFING TILE.

The manufacture of roofing tile is a comparatively new business in this country, and originated in Europe, where, as well as in other countries, tile, in a great variety of shapes, has been made for centuries past. Since its introduction into this country, its use has become very general, and is fast taking the place of other material formerly used for roofing purposes. Already many fine mansions, extensive shops, churches, and ordinary dwelling houses are covered with tile roofs, in different parts of the United States, and the universal expression of those concerned is that of entire satisfaction.

When the tile is burned, there is no question as to its durability. Its past use has well established it in this respect. There are roofs in the old country that were put up hundreds of years ago, which are as good to-day as when first exposed to the sun. Articles made of burned clay are the most durable of anything made by man. We find pieces of pottery and sewer pipe, in good state of preservation, in the oldest ruins, where almost everything else has perished. Our tile does not fade like slate, but, on the contrary, grows darker with age.

Objections to roofing tile, in this country, have heretofore been made to the effect that the tile was heavy, made of coarse clay, poorly burned, that it would absorb a great amount of moisture, so that freezing and thawing would cause it to crumble, and, in appearance, was anything but handsome. Whatever foundation these objections may have had in the first products of tile, in our tile we have met and fully remedied all of them.

A great advantage for the tile roof is that it is a non-conductor, and, therefore, cooler in the summer season than any other kind of a roof. The buff tile, being lighter in color, is the coolest, as it does not absorb the rays of the sun.

The tile are perfectly indestructible, and are not effected in the least by heat or cold. It will not crack and slide off the roof, like slate, leaving the sheeting exposed, when subject to a sudden heat, caused by the burning of a building near by.

We claim that a tile roof is the only perfectly fire-proof roof in existence. It was fully proven at the great fires in Chicago and Boston.

The manufacture of roofing tile is a comparatively new business in the United States, and originated in Europe, where, as well as in other countries, tile, in a great variety of shapes, has been made for centuries past. Since its introduction into this country, its use has become very general, and is fast taking the place of other material formerly used for roofing purposes. Already many fine mansions, extensive shops, churches and ordinary dwelling houses are covered with tile roofs in different parts of the United States, and is giving universal satisfaction.

When the tile is well burned there is no question as to its durability. There are roofs in Holland that were put up hundreds of years ago which are as good to-day as when first exposed to the sun. Articles made of burned clay are the most durable of anything made by man. Terra cotta tile does not fade, but grows darker with age. A roof covered with good, well-burned tile, will last for generations without any attention whatever. They are not effected by acids or the sulphur smoke of soft coal.

Objections to roofing tile in this country have heretofore been made to the effect that the tile was heavy, made of coarse clay, poorly burned, that it would absorb a great amount of moisture, so that freezing and thawing would cause it to crumble, and, in appearance, was anything but handsome. Whatever foundations these objections may have had in the first products of tile, the same have been met and fully remedied.

A great advantage for the tile roof is that it is a non-conductor, and therefore very cool in summer. The buff tile being lighter in color, does not absorb the rays of the sun. The tile roof is a protection against lightning. The rainwater collected from a tile roof is pure and clean, and the tile so smooth that soot will not settle on it.

Roofing tile is perfectly indestructible, and is not effected in the least by heat or cold. It will not crack, or slide off the roof when subject to the heat from a burning building near by. It is claimed that a tile roof is the only perfectly fire-proof roof in existence, as was demonstrated at the great fires at Chicago and Boston, where roofing tile stood the test so well.

Enameled Brick.

Editor Clay-Worker:

In resuming the subject of enameled brickmaking, permit me to quote a passage from history that eminently fits this subject. It was said by a tutor to a royal personage, that there was no royal road to the acquisition of knowledge. This fact is specially applicable to this business, therefore a start must be made at the beginning, and we will deal with one or two of the causes of failure. We shall not exhaust the subject in this paper.

First, cause and the root of failure is a want of knowledge of certain elementary facts. Glaze bricks differ from all other glaze goods in every particular in the composition of the glaze and enamel, and in its variation to suit the infinite varieties of clays. Potters professing to be well versed in the art have tried to make them but have failed, for the simple reason that they have applied their art to brickmaking, that is, using what is known as fret and raw earthenware glazes, largely composed of oxide of lead to clay bodies, leaving out of their calculation that a brick is made from materials just as nature has supplied them, whilst earthenware bodies are made up of several materials in definite quantities—body and glaze made to suit each other, and therefore the two sets of operations must of necessity be widely different. The result has been that enameled brickmaking has never come under the denomination of earthenware manufacture but has always remained in the hands of brickmakers and there is not a brick company of any note in this country but has had a dip into it. For a certain class of men it has been a happy hunting ground. The game is not so plentiful now, but yet we have one of them coming across our yards about every two weeks. Their pedigree is perfect, they know every place from John O. Groats to lands end; their grandfather and father and all their brothers have, and are making first-class stuff; they have got the Leeds tip and they can see at a glance that your clay is just the thing for the job, and if they fail to get on the top of you in this way they will give you the whole programme for a shilling.

Well, sir, I am glad that many of those who have tried it have not succeeded; if they had the trade in this country would not be worth following. But there are another class of men who do know something about this matter,

and who have made fairly good bricks at some one place, but have utterly failed at any other, and why? Because they have not studied the first rudiments of the business; they have come to know that there are such things as Cornwall stone, flint, feldspar, Paris white lead, and other things, which when thrown together in certain proportions and subjected to heat will flux into a glaze, but how these things act one on the other, and on the mass, they know no more than the man in the moon, and they act as though they thought the clay, coals, and the local circumstances and conditions (which all have a definite bearing on the matter) were the same the world over, and that the same glaze and enamel would do at every place, and when they come to be undeceived they make alterations at a venture, without any knowledge of the bearings it will have on the whole, and the rule is, they get farther away from the object aimed at, and manufacturers here have very largely contributed to keep up this delusion. I will give one instance out of many I could name.

Ten years ago one of the largest firms of fire brick makers in this country were wishful to make these goods for themselves (they were large buyers from other makers); they advertised for a first-class man (as some of your manufacturers are doing); they got one from the only district where high class goods are made—the place he came from being a sufficient recommendation. They put up erections especially for the job, under his instructions, costing a large amount of money, and began their operations, but it was a total failure from first to last, and he was not an ignorant inexperienced man in the general methods of procedure, but he was wanting in those points necessary to success in this special place (some of which I have named and others which I will name in my next paper). This firm has made several changes in the men, all with the same result, having at this time, their place crowded with hundreds of thousands of inferior bricks, and I have, only a few days ago, received a letter from a friend of mine, in which was one inclosed from this same firm, still asking for the first-class man.

I have no doubt, sir, but your readers (the manufacturers) will see this to be a very gloomy picture, but there is in it food for reflection which will do them good if they will try to digest it, and the light will come further on.

MANAGER.

A Common Experience.

Editor Clay-Worker:

We are advocates of fair play and believe in "giving honor unto him to whom honor is due." The *Brickmaker* has had a great deal to say about the small circulation of the CLAY-WORKER and its consequent inferiority as an advertising medium. About a month ago we inserted the following "ad." in both papers:

"FOR SALE. One 75 h.p. Westinghouse engine as good as new; only used about two months. Will sell cheap."

There were two issues of the *Brickmaker* containing the "ad." out before the first issue of the CLAY-WORKER came out, and before that issue of the CLAY-WORKER had been out a week, we had received seven inquiries mentioning the CLAY-WORKER. We sold the engine three or four days ago and the inquiries are still coming in, but up to the present writing we haven't received a single inquiry on account of the "ad." in the *Brickmaker*. We tender our thanks to the CLAY-WORKER for finding us a purchaser for our engine and heartily endorse it as a first-class advertising medium.

Warners Portland Cement Mfg. Co.

The Fuel Question.

Editor Clay-Worker:

Let me thank you kindly for reading my paper, and, as I stated in my letter requesting you to read it, that I would reply to any questions raised, through the columns of the CLAY-WORKER, I wish to do so.

First, I wish to bow my acknowledgments to Mr. Purington for the compliment he paid me, and shall be glad to exchange letters with him. My thanks are also due to Frank B. McAvoy for the able backing up he gave me, and while on the whole his remarks about the terms on which I offer to build producers, etc. are correct, I wish to qualify his statement a little. My offer to Mr. McAvoy is on the basis he has told you. I would not, however have it understood that this offer is open to all. I reserve the option of a "yes," or "no," for experience has taught me that some discretion is necessary in making contracts of this description.

The plant at the Peoria Grape Sugar Works, referred to in my paper, was contracted for and built on that basis, and did not cost the firm one cent, but their recent additions of boilers, bone kilns and gas producers, were bought and paid for in the ordinary way. They prefer now, reaping the benefits from the be-

ginning and not paying so much for them *indirectly*.

Mr. Thad. Smith is the next entitled to my attention, and is a gentleman whom I should like to be acquainted with, estimating him by the merits of of his paper; and the same may be said of Mr. Lovejoy; and for that matter, all the readers, and I hope for an acquaintance with them all.

Well, now, Mr. Smith, I am very sorry I disappointed you with the quality of my gas, and I am afraid I shall not mollify matters by airing my views on water gas.

"Hydro Carbon" has written on this subject for the CLAY-WORKER. I have had the privilege of reading this letter and all I have now to say on the subject is that our views (Hydro's and mine) run exactly parallel and in the same direction.

The producer described in my paper is in principle a Siemen's producer. None of the gas producers I have seen are much removed from it, they are derivations from the same root. You say, or I understand you to say, you have had no experience with water gas. Well, see all you can and hear all you can about it before you buy any of it. I do not say this in an advising humor, but to show you inferentially that I take no stock in it for manufacturing purposes on a large scale; the reasons Hydro will point out by and by.

Now as to producer gas causing streakiness in red brick, I cannot account for it unless the producer was one that had one of those absurd adjuncts a *steam jet blower*. I would take it as a personal favor if you could ascertain this for me.

Speaking of this streakiness to Mr. Ittner the other day, when he was in Philadelphia, I reasoned thus: If the products of combustion caused the streakiness the same thing would have occurred if the fuel had been burnt on a grate the usual way. If it was due to excess of sulphur in the fuel the same reasoning holds good; of other impurities the same may be said.

My experience extends only to the burning of fire brick with gas; these I *know* were burnt clean and well. There are certainly some works using producer gas that can testify on this point.

To Mr. S. P. Crafts I would say—you are by no means alone in your belief, or disbelief on the subject of wasting your fuel. I am quite ready to admit that you voice the opinion of the majority of your craft. When I went to school one of the headlines in my copy book was:

"Opinion sometimes guides men more than reason." Is it not possible that this may apply to you in the present instance? I grant, however, that you are entitled to your opinion until it is shaken by conviction. I like your candor; it is one thing in your favor, but don't abuse it.

Away back in the sixties, the late Sir C. W. Siemens came to Sheffield, England, and informed the steelmelters they were wasting 80 per cent. of their fuel in melting steel—it required at that time about 3½ tons of coke to melt a ton of steel—so you will easily understand how dubiously such an announcement was received; in fact, very few of the steelmelters looked upon it as anything but a preposterous "canard," and there was no hesitation in denouncing him in terms that would not look pretty in the CLAY-WORKER. I am sorry to say I was more emphatic than discreet on this occasion. Mr. Siemens was not a steel melter in any sense of the word, but he undertook to melt steel with one-sixth of the fuel that was then considered necessary and he did it.

When Mr. Davis informed you of the 75 per cent. you were wasting, he was perhaps much nearer the mark than I was. This, however, did not assist your convictions any but drew from you the *Reductio ad absurdum*. Now this may in some instances be used very effectively, if well sustained by previous reasoning. "Getting the laugh" on an opponent is no proof of sound reasoning.

Mr. Siemen's proposition appeared extremely ridiculous to the Sheffield melters but it sinks into obscurity when compared with the proposition of Sir Henry Bessemer, who a few years previously announced that he would raise the temperature of molten cast iron and convert it into steel without any fuel whatever, and this in the short period of 20 to 25 minutes. I need not say how he was ridiculed by the leading London paper and by scientists too, but he did it, and ridicule, like the boomerang, returned to the hand that threw it.

Now, Mr. Crafts, I do not claim to be a Bessemer, nor a Siemens, although I have rubbed against them both. I only claim the distinction of belonging to the brotherhood of the N. B. M. A., and as such address myself to your convictions, leaving them to deal with your belief.

WM. WAPLINGTON.

Whatever you dislike in another person, take care to correct in yourself.

In and About London.

Editor Clay-Worker:

There is little satisfaction in doing good architectural work in London. The climate is against permanency in external beauty. The air is full of moisture and on a frosty day many of the best buildings are white and streaked with frost. The moisture oozes out, freezes and runs down in jagged, irregular outlines. Then there is the smoke and fog which together form a pasty mixture, which begrimes and blackens everything with which it comes in contact. There is none of the bright, fresh colored brick work which we see in our American cities and towns. That of New York or Chicago, though in a smoky atmosphere, is quite attractive as compared with that of London. Yet, even under the discouraging circumstances with which London architecture is surrounded, there is a great deal of beautiful work; that is, it is beautiful in outline and detail, though rarely attractive in color or texture for any great length of time.

BRICK FOUNDATIONS.

A very large use of brick is made. They are of good quality—hard, good form and are well laid. Underground brick work for foundations and otherwise is much more common than with us. Surely there can be no climate more trying on this underground work than that of London, and the result thereof justifies the statement that we are laboring under a strong prejudice in using the large quantities of expensive stone work that is so common with us. Particularly is this true with respect to foundation work.

I saw a number of English brickyards, but I am disposed to say that we have not a great deal to learn from them in the way of brickmaking, in so far as it pertains to a common merchantable article. As to the manufacture of enameled brick and especial work of this character there is much there for us. One reason why we cannot expect to get a great deal from their methods of manufacturing common brick is because of the lower cost of labor in Great Britain. There is not the same inducement to labor saving machinery that there is with us. Furthermore, we have passed through that stage of brickmaking where a great deal may be picked up by merely walking through the brickyard. The art of brickmaking with us is at that stage where our improvement is largely

to be made in the finer and more delicate details, rather than in the general processes which may be visible in an excursion where one merely observes what is being done in the ordinary processes of manufacture.

COST OF BRICK.

Notwithstanding the fact that the cost of labor is less in English yards than with us I am disposed to say that their brick is costing almost, if not quite, as much to the producer as with us. I do not see that they have the same system looking to the saving at all ends and general low cost production. The bricklayers' labor costs a great deal less than with us, for which reason brick in the wall is generally cheaper than in America.

In the matter of the manufacture of terra cotta, vitrified sewer pipe, tiles, decorative clay work and the higher grade products of that kind, I am free to say that I think Great Britain far in advance of us. There may be one instance in the manufacture of tiling, viz., the Low Art Tile Co., of Chelsea, Mass., where a higher class of artistic work is done than in Great Britain. But their work is very high priced and should not come into the class of commercial clay work. However, if we take the general run of English clay products of the class named, I think there can be no doubt but that they are way in advance of us, and in order that we may make proper progress it is best to acknowledge facts of this kind and get down on our marrow bones and go to work.

AN INFANT INDUSTRY.

There is a much larger field for clay work in America than it now occupies, viz., in the manufacture of a cheap grade of tiling, paving, sinks, wash trays, tubs, enameled bricks, a coarse quality of wall tiling and many products of like character. Not but that many of these articles are now made in America, but they are not made on a large commercial basis. They are produced and sold at fancy prices, require a great deal of pushing, and a relatively small business is done. If marketed at a fair price all these things, instead of being regarded as luxuries to be used only in the houses and buildings of the very wealthy, would be regarded as the necessities of comfortable living for all people and in all buildings. Thus there would be made a market for a very much larger output of clay work than is thought of to-day. The variety of this sort of thing is very great both in England and France. The manifold uses to which clay products are

put can hardly be enumerated in an article of this character. But I may speak of a cheap article of floor tiling. I have seen large quantities which are about eight or ten inches square and a little less than an inch thick. They are used on a concrete bed for flooring courts, large buildings, ware houses, kitchens, hallways and like places. Generally they are unglazed, though in some instances they have a corrugated surface with a glaze of light color of about the same quality as is common to the higher grade of sewer tile. It makes a very beautiful, cheap and substantial floor.

L. H. G.

Burned Clay Ballast.

Editor Clay-Worker:

I submit you the following, the result of a test. If you think it of any importance, an insertion might be of some value.

THE UTILITY OF BROKEN TERRA COTTA PIPE FOR RAILROAD BEDS.

Some three years ago, the writer, as a test, had some broken terra cotta pipe placed between the railroad ties, and at the same time placed broken cinder, (same as now used by Railroad Co.'s), a few feet apart under and between other ties.

A few days ago we took up all the ties and found that those laid in the broken pipe were dry and in a good state of preservation, while those in the cinder were showing signs of decay.

It proves that the terra cotta, being more porous than the cinder, it draws the dampness from the ties and prevents decay.

W. S. STEPHENS.

Days Gone By.

Editor Clay-Worker:

A friend of mine a few days ago put the special convention number of the CLAY-WORKER in my hand, with the remark that I would find something interesting in it, and I did. On page 113 I saw the portrait of an old friend, one whose memory calls up vivid recollection of an eventful period, a face though changed by the spectacles and "Frosty Brow," yet still wearing the old-time genial smile. Memory carries me back to the early sixties, when "George" was Squire in that Town of Brick (Haverstraw). The representatives of the people at Albany thought that each town should have an organized Infantry to protect them. A draft was ordered of all men from eighteen to—well, "George"

was in it, (and he was somewhat over eighteen). He was appointed Captain. Probably some of the "gray hairs" came from this experience with the raw material, so hard to deal with. The boys were "Raw" and the Captain was "Tender." No doubt in the short time between his appointment and the first time he ordered us to meet at "Ike's" he had studied "Hardee" until he thought he was able to command a division. The eventful evening came and thirty or forty young men answered roll call. They were there for a good time—never mind at whose expense—they knew nothing about drill. I am inclined to think the Captain was in the same boat. George had lots of dignity, but to maintain it in that crowd was impossible. Some one would say, "George, some one is kicking me," another, "Squire, I have not got room enough," still another, "Oldfield, what is that you say," till life became a burden.

The National Association through the North and South is doing good work. There is wanted in this section something that will hold the manufacturers together. There was formed last year an organization to protect manufacturers. If it would be acceptable to you, I will give you an article on its workings.

I see that the names of the various articles that are used in the manufacture of brick vary in different States. In our section the "cap." is called a "saddle." We use "battens," no "splash boards." In some sections the name for "battens" is "eaves trough" and "barricades." The trucks are called "gudgeons." I have been informed by men that have worked on yards in the South that they call the burnt and green barrows "he" and "she barrows." Is it possible?

The trade in this part of the country has a very blue look for the next season. Hackensack, N. J. A. N. OLDTIMER.

Paving Material Wanted.

Editor Clay-Worker:

The City of Knoxville, Tenn., is about to expend \$125,000 on one of her principal streets. It's going to be a question between paving brick and granite or asphalt. The Warren-Scharf Asphalt Paving Co. are already here with pamphlets and circulars condemning brick. I have no personal interest in either, and so far no one is here with circulars and facts in favor of brick. From the careful reading in the CLAY-WORKER which I gave the proceedings of the Fifth Annual Convention of the National Brick

Manufacturers' Association, I was favorably impressed with brick for street paving. If you or any of your brick-making friends are interested enough to look into the matter here, I write simply to give you the opportunity.

A. G. HOWE.

WANTS A CRUSHER.

T. A. Randall & Co.

DEAR SIRS—Enclosed please find check for CLAY-WORKER. We take great satisfaction in reading it. I am in want of a mill to grind brick bats to a very fine powder. If you can give me any information on the subject it would be thankfully received.

G. H. CUTTING.

Worcester, Mass.

One of the Family.

T. A. Randall & Co.

GENTLEMEN:—Please find herewith our subscription to the CLAY-WORKER for the current year. We are among your oldest subscribers and can now only refer to former communications renewing our subscription to express our estimation of your journal, reinforced by the assertion that we now consider it a member of our household, whose absence could not be supplied by any similar publication.

Wishing you the success you so richly merit, we remain,

RICHMOND, VA., FORBES & MANN.

Written for the Clay-Worker.

MORE EXPERT, PRACTICAL, INTELLIGENT BRICKMAKERS WANTED, AND HOW TO GET THEM.

BY J. W. CRARY, SR.

AFTER Daniel Webster had attained the highest point of fame as a great lawyer, a self-conceited young man of a wealthy Boston family, called to see Mr. Webster to tell him that he had made up his mind to be a lawyer, and to ask Mr. Webster for his opinion about it. Mr. Webster looked at the would-be great lawyer, with a bland sort of smile, and facetiously remarked: "Well, William, I'll tell you, there is plenty of room, plenty *up stairs*, but it is very much crowded *down below*." This terse, and very significant witticism will fitly apply to all trades and professions, but I think it will especially suit the brickmaking craft, at least so far as real expert intelligent practice is concerned.

There is a large and increasing demand now, for first-rate, skilled brick-makers, and many brickyards, especially

new ones, are laboring under great disadvantages for want of real competent men to give practical direction to the operations. There are very many now engaged, with their capital, in the manufacture of brick, who are entirely dependent on the skill and expertness of such employes as they can *pick up*, from those who have only had a short experience.

Now the question is, How can a fair, good supply of intelligent, skilled, practical brickmakers be had? It is a hackneyed truism, that "*demand* will always bring *supply*."

Now if brick manufacturers will join and agree, that they will encourage voluntary apprenticeship, of young, intelligent, energetic men by giving them a fair chance to learn brickmaking by practice, and then when a young man has served his three or five years, give him a certificate, or a diploma, to show that he is capable of taking charge of any part of a *brick plant*, and then classify his grade of skill and pay, so that in the absence of a special agreement, his services will insure him a certain good pay and position, and that he will be recognized by all respectable brickmakers as a professional expert, and treated with kind and respectful consideration. Do this, instead of demanding only the cheapest *muscle*, and cheapest *brains*, which can never give you anything but bad brick, and bad burns, with small profits, and a low reputation as a manufacturer, and I am sure you will have a good supply of respectable, intelligent, skilled and energetic expert employes.

PROPOSED REMOVAL OF A WELL-KNOWN FIRM.

The old saying that "Nothing Succeeds Like Success" is never more of a truism than when applied to the business of a prosperous and successful manufacturing enterprise, and this is especially true of the well-known firm of E. M. Freese & Co., of Plymouth, Ohio, manufacturers of the justly famous "OHIO" Brick and Tile Machines. This firm, after years of constant study and untiring perseverance have, step by step, brought their line of machinery from the level of their competitors to that approximate perfection sought after by all manufacturers. The time has come to them when the superiority of their machinery is an assumed fact. The "OHIO" machines, with their great weight and accompanying strength, and superior mechanical construction,

attract the attention of the careful buyer, and when the ease and simplicity of operation are known, the quantity and quality of product seen, nothing remains to be desired. The success attending the operating of these machines has been remarkable, wherever placed in any works they have universally proven satisfactory.

The demand for their machinery has been so great that the Works of the Company have been taxed to a point almost beyond their capacity, compelling them to run night and day. To meet this demand, which is constantly increasing, the Company found it necessary to build larger Works, and in order to obtain increased shipping facilities, decided to change their location. Some months since a contract was made for the erection, during the coming season, of new Works, which will be located at GALION, OHIO, at the junction of the Big Four and New York, Lake Erie & Western Railroad. These Works when completed will be among the largest and most extensive of their kind in the country, and will be equipped with the most approved line of machinery for the manufacture of this class of work, and they will be prepared to more promptly execute all order entrusted to their care.

Due notice of their removal, which will not occur before the latter part of the season, will be given.

In addition to the very complete line of brick and tile machines which they now manufacture, including six different sizes and styles of late and improved design, having capacities of from 10,000 to 40,000 brick daily, they are now at work upon, and will complete during the present season, two new machines of much larger capacity, embodying further valuable improvements.

They are also perfecting something new in Brick Cutters, intended especially for the end-cut paving brick called for in the West.

They have informed us that their Improved Board Delivery Brick Cutter has been found such an unqualified success that imitations and infringements have already made their appearance, which they say are the production of those as deficient in sense of honor as in inventive ability.

See advertisement on page 473, of their new "OHIO" Brick Machine and Cutting Table, or write them for descriptive circulars. In our next issue we will give a cut of their new brick machine called "A" Special.

THE CLAY-WORKER.

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should give both the old and the new address.

ADVERTISING RATES furnished upon application

Correspondence on all subjects of interest to Clay
Workers is solicited. Communications from practical
men will always be welcome. Address all
communications to

T. A. RANDALL & CO.,

81 Massachusetts Ave. Indianapolis.

IMPORTANCE OF GOOD WORK.

We wish to sound a word of warning about brick for street pavements. While it is not a new material for that purpose it has not passed beyond the experimental stage with the public. There are certain cities where it is used satisfactorily to all. Generally speaking, however, it is not well known. It is to be born in mind that public opinion will have a great deal to do with the use of brick paving. Makers of brick must not neglect this. While they may know and feel certain that a nonabsorbent brick is the right thing for pavement they must remember that it is not their opinion alone which will control this. It is to be born in mind that a few bad pavements will make much trouble for the clayworkers of the whole country and it is here that we wish to sound the word of warning. It is a new field for clayworkers. It promises a great deal, and, if properly handled, will pay well. In order for this to be true, however, we must have the right kind of brick and the brick must rest on a proper foundation.

* * *

It is not for us to suggest what this may be. There are many different opinions on this subject. We are free to say this, however, that if great care is not exercised in the foundation, brick as a paving material will suffer. If the public looks on the pavement and sees that it is irregular, that there are depressions in it, that it sinks down, they will say: "Here is a bad pavement; brick will not

do; we must have granite or asphalt, macadam, or anything but brick." If the pavement gets badly out of shape in time and is torn up, something else is put in its place. This is unreasonable, we will say, but the public does not make fine distinctions. So we say—be careful. Do not try to make a cheap pavement. Make it good at any cost. It will not do for brickmakers to say: "The foundation is not my business; I am not laying the pavement; let the engineer and the contractor see to that." This will not do because it is not to the interest of the brickmaker to take this view. It would be a good deal better, too, for him to refuse to furnish brick to go on an improper foundation than to sell them at any price. In order for brick pavements to be a large success it is only necessary that they rest on a good foundation.

* * *

One of the strongest points about brick as a paving material is that it is a new material. It has no bad history back of it. All of the old pavements can be assailed with force and effect. We can point to bad asphalt pavements. We can say that wood has not been a success and prove it. Many bad things can be said about stone, and much of it unjustly, but none the less effectively. It is what has gone under the pavement which has made so much trouble. Careless workmanship, ignorance, parsimony, stupidity; hence, bad history. Say that brick paving is no better than any of the other pavements which have gone before it. Even then it has a better chance of success than any of the others. It comes after them. It may profit by their mistakes.

SUPPLY AND DEMAND.

Does the supply create the demand? It seems at times as if such is the case though, at first thought, the idea may seem to border on the ridiculous. Articles which are regarded as luxuries or curiosities this year are matters of every day necessity next. We can all remember the history of the telephone. It was first a curiosity, then a luxury and now a necessity. There was a time when our ordinary cooking stove was regarded as a wonderful invention. If we had waited until there was a demand for a telephone before it was invented, we would never have had it. The manufacturers of any new article in building work, such as hollow tiles for fire proofing, and mineral wool, seek uses to which it may

be put, represent it to the people and thus secure its introduction. It will not be many years until a slate roof will hardly be thought of because there is no material used for roofing which is inherently so bad for that purpose as slate. The Factory Mutual Insurance Companies of New England prefer a shingle roofed building as the less of two evils. A moderate degree of heat breaks a slate roof to pieces. The covering of a grain elevator with slate, as it has been done, is sheer nonsense. The reason people use slate is because they have nothing which exactly takes its place. They would jump at a tile roof if they could get it. Cast iron kitchen sinks and copper bath tubs are used because people cannot get anything better at a fair price. A brown earthenware tub or sink made and sold at a fair price would develop an immense business, and millions of them could be sold every year. No one likes a copper bath tub, yet very few people are in a position to pay for a white earthenware one which costs from \$125 to \$150. A bath tub that could be made and sold at retail for \$25 or \$30 would sell itself. It would not have to be white, but could have about the same surface as the outside of a jug. Thus it would turn from a matter of luxury to one of necessity and every day requirement. All we have to do to increase our clay business is to make a new article and put it on the market at a fair price.

* * *

It is a truism that abnormally high prices will prevent sales. They stand as a hinderance to business. Nevertheless, the introductory prices of new products are nearly always placed so as to show an absolutely large profit on each article sold. Architects and builders who have been in business long enough to know the history of various articles and supplies which go into buildings know that nearly every new thing which is brought to their attention starts in at a high price and that it is slow to move. In fact it does not show any great signs of life until the price is relatively low. There are more reasons for this than the fact of cheapness. Cheapness alone does not increase the sales; but as the article is introduced the number of sales and the use of the article advertises it, and the ratio of sales is therefore greater than the proportional reduction in the cost of the article. The principle herein involved is one which may well carry with clayworkers. There remain many new articles in clay to be made and sold in

American markets. Our foreign correspondent gives a suggestion of what may be done, but does not by any means cover the entire ground. There are tile roofing, enameled bricks, clay sinks, bath tubs and many articles of like character which are now regarded as luxuries, which, by being manufactured and sold at low cost, may rapidly become a great business. The matter of tile roofing alone should support a manufactory in every fair sized town in the country where there is suitable clay, but where such an article is made and put on the market at a high price, because it is a new thing though a good one, it makes a slow business.

TRADE LITERATURE.

STEAM SHOVELS: We have received a handsome catalogue from the Marion Steam Shovel Co., Marion, Ohio. This firm claim to have the largest and best equipped plant for the manufacture of Steam Shovels in the U. S., and, judging from a sketch of the works given in the catalogue we can readily concede such to be the case. However that may be, we know they are making the best Steam Shovel for brickyard use and advise our readers to write to them for their catalogue, prices, etc.

"SHARER'S IMPROVED DRYER" is the subject treated at length in a neat book of thirty odd pages, issued by Geo. W. Sharer, Philadelphia, Pa. The advantages claimed for this Dryer, cut of which may be seen on page 380 of this issue, are many and the success achieved by Mr. Sharer at various points throughout the country prove that they are well founded, as are also the claims for the Sharer Improved Calorific Kiln, which is also fully described and illustrated in the catalogue, copy of which will be sent to any one of our readers on application to Mr. Sharer.

"BRICK AND TILE MAKERS' SUPPLIES" is the title of an attractive 24-page book published by D. J. C. Arnold, of New London, O. Mr. Arnold, whose genial face is pictured on the first page of his catalogue, was one of the first to engage in the manufacture of, and devote especial attention to the production of brickyard appliances. He began in a small way to make brick molds, and by careful workmanship and diligence soon worked up a large trade. His name is now familiar to brickmakers throughout the country, and, from the manufacture of brick molds, his business has developed into

an extensive manufactory, embracing all kinds of brickyard supplies. Those wanting anything in that line should write for his catalogue.

"OLD RELIABLE" BRICK MACHINES and other Brickyard Supplies are fully illustrated in the new descriptive catalogue and price list issued by the Tiffin Agricultural Works, Tiffin, Ohio. In addition to the "Old Reliable" they now make the "Tiffin" Automatic Brick Machine, for both horse and steam power, and a full line of Clay Crushers, Elevators, Pug Mills and Brickyard Supplies, which they claim their facilities for manufacture enable them to offer at very low prices. Write for their catalogue.

"LEVIATHAN" is the title of a little pamphlet published by the Main Belting Co., of Chicago, devoted, as the name implies, to the interest of Leviathan Belting, which, if we may judge from the many testimonial letters from users, is the best belting for clayworking machinery, it being peculiarly adapted to such work. Read the "ad." on page 436 of this issue, or write for a copy of "Leviathan."

Our Philadelphia Correspondent writes that the present outlook for a brisk trade for clayworkers is very encouraging. There will be many expensive residences erected that will require material of the best quality, and quite as many brick are expected to be placed as in 1890. If there is no labor troubles or strikes the coming season will undoubtedly be a very busy one.

The firm of Booth & Flinn, of Pittsburgh, Pa., are enlarging their factory, and adding more machinery. They have in use one of the "A" Special Brick Machines, made by E. M. Freese & Co. of Plymouth, Ohio, (see "ads." on pages 421-473) and have lately ordered another of the same make. In ordering, under date of March 31st, 1891, they say:

"Please send us a Terra Cotta
Machine of the same make as
"the one we bought of you some
"time ago. We are much
"pleased with its work, as it has
"given us entire satisfaction.
"We cheerfully recommend it to
"any of the Brick, Tile or Terra
"Cotta Manufacturers as the best
"machine we ever used.

Jas. Bodley, Sr., a well-known brick manufacturer of Wheeling, W. Va., died March 26th, aged seventy-four.

Cause and Effect.

He sat at his door at noonday
Lonely, glum, and sad.
The flies were buzzing about him,
Led by a blue-winged gad.
Not a customer darkened his portal,
Not a sign of business was there;
But the flies kept on buzzing
About the old man's hair.
At last, in misery he shouted:
"Great Scott! I'm covered with flies!"
And the zephyr that toyed with his whiskers, said:
"Why don't you advertise?"

EDITORIAL NOTES and CLIPPINGS.

A brick plant is to be erected at Arvada, Col.

W. C. Cassell will make pressed brick at Albany, Ore.

Mr. A. Alvord will make brick near San Antonio, Tex.

The Salt Lake Brick Co. will erect a plant near Murray, Utah.

There is talk of starting a terra cotta establishment at Vincennes, Ind.

The Tiffany Iron Works show a cut of their new Cutting Table on page 464.

Smith & Mitchell will make brick at Greenfield, Mass., the coming season.

Clarence Gill, of Decatur, is thinking of starting brick works at Huntsville, Ala.

Louisville, Ky., will give vitrified brick a trial on some of her prominent streets.

G. B. Roller is putting up an Eagle Brick Machine on his plant near Canton, Ill.

It is claimed that there are large deposits of fine fire clay near Buena Vista, Va.

Carrons & Sons intend to add an artificial dryer to their plant at Front Royal, Va.

The Croton Brick Co. is putting up a finely equipped plant at Croton Landing, N. Y.

David Davidson has purchased the brick works of G. J. Knight, at Greenfield, Mass.

Robt. Holloway will likely organize a company to establish a pottery at Denton, Texas.

Lou Morton and Chas. Doan are preparing to start a brickyard at Gallup, N. Mex.

The Excelsior Press Brick Co., of North Lebanon, Pa., are putting in additional machinery.

The prospects are good for a very busy season for the brickmakers at Dover Point, N. H.

Oliver R. Mathers, Pelican Rapids, Minn., will start a brick and tile plant at St. Louis.

Capt. E. A. Dudley and Jas. Horn are thinking of starting brick works near Jonesboro, Ala.

The Fuller Brick Co. has been organized and will probably establish works at Pine Grove, Pa.

H. T. Powell, Rochester, N. Y., writes that he intends to go into the manufacture of press brick.

Asa Hepner and W. H. D. Warfield will engage in the manufacture of brick at Ellicott City, Md.

The Peerless Brick Co.'s works at Twin Bluffs, Ill., will be enlarged to double their present capacity.

The Oil City (Pa.) Brick & Tile Co. has been organized and will erect large works at Two-Mile Run.

The Demary brickyard at Essex Junction, Vt., is to be overhauled and steam power machinery put in.

C. W. Kilbarn is overhauling his brick works at Bridgeport, N. J., and putting in some new machinery.

Strickland & Potter have purchased land and will probably establish brick works at Cromwell, Conn.

It is reported that parties from Somerville are going to start a brick plant at White House Station, N. J.

J. W. Thomas and Thomas McDevitt, of Steubenville, contemplate building a pottery at Morristown, Tenn.

The Steam Brick Co., Frederick, Md., has been incorporated by Col. C. E. Frail, D. C. Winebreuer and others.

Josephus Crafts will put in a line of new machinery in the brickyard he is operating at Northampton, Mass.

The Crescent Fire Brick Co., are making extensive improvements in their works, at Cochran, near Layton, Pa.

D. C. Brown and H. A. Parmalee, Brandon, Vt., have formed a partnership and will engage in manufacture of brick.

The Riverside Brick Co., Bridgeport, Ala., has been incorporated, by T. E. Cross, E. A. Hoffman, Jr., and others.

It is reported that good brick clay has been found near Callahan, Fla., and a factory will probably be started there.

The Indiana Paving Brick Co., whose works are at Brazil, Ind., have purchased the Brazil Brick and Sewer Pipe plant.

Jno. Adams, Walton, N. Y., will put up a New Quaker Brick Machine and otherwise enlarge and improve his brick works.

The boiler at William's brickyard, near Pittsburgh, Pa., exploded, killing John Jones, a workman, and doing considerable damage.

The Wellington (O.) Machine Co. present some very flattering testimonial letters from users of their "New Quaker" on page 446.

E. C. Gossel, Jackson, has purchased the William's brickyard at Rapid City, S. D., and will enlarge and improve it considerably.

Rutland, Vt., is considered an excellent site for a large brick plant. The demand for brick being largely in excess of the supply.

A large deposit of excellent clay is being developed near Ft. Dodge, Iowa, and it is likely a press brick plant will be erected there.

The Corning Clay Works, of St. Paul, Minn., has been incorporated with capital stock \$25,000, by Charles M. Moulton, E. V. Johnson, and others.

The National Clay Co., Moline, Ill., has been incorporated with \$100,000 capital, by S. N. Jones, A. E. Rutledge and W. E. Butterworth, of Rockford.

The Olney (Ill.) Paving Brick & Tile Co. has been organized and are now looking about for the best machinery, etc., etc., for building and paving brick.

"Mike" Nolan, of Nolan, Madden & Co., Rushville, Ind., says they are too busy for comfort. The orders for their "Hoosier" Brick and Tile Machines are unusually heavy.

The City Council of Florence, Ala., has closed a contract with a Chattanooga concern for over 6,000 feet of ten inch terra cotta piping to be used in draining streets and low lots.

A Milwaukee subscriber writes that the prospect for an active season there is very good. A large number of large buildings will be erected and brickmakers will be kept busy.

L. H. McCammon, well-known to brick and sewer pipe manufacturers at Pittsburgh, Pa., and Cincinnati, O., died at Stockton, Cal., where he was visiting March 24th, aged 35 years.

EVERYWHERE it is being asked: "What about the Kindergarten work that seems to be one of the advanced ideas of the day?" Subscribe for THE KINDERGARTEN (Chicago) and find out. \$1.50 per year; sample copy six cents.

The Coate Brilliant Pressed Brick Co., of St. Louis, has been incorporated, with a capital stock of \$60,000. The officers are S. T. McCormick, Pres., J. L. Ennis, Vice Pres., R. F. Kilgen, Sec'y and Treas. They are building a plant near the Union Hydraulic yards in St. Louis, and are putting in SIMPSON PRESSES.

Many manufacturers are now arranging for various improvements in their works for the coming season. The putting in of new machinery of larger capacity will leave them with small machines and appliances that are to all intents and purposes as good as new, which may be easily disposed of by a small "ad." in our "For Sale, Wanted, Etc., column.

The Webber-Lebahn Brick Co., Chicago, will put in two of Chambers Bros. Co.'s largest brick machines and a complete outfit of clay crushers, granulators, elevators, pug mills, friction hoisting drum, etc., all furnished by the Chambers Bros. Co. They will also put in a steam shovel from the Marion (Ohio)

Steam Shovel Co., and a Corliss engine. They expect to be making brick by June 1st, and intend to have one of the best equipped yards about Chicago. The officers of the Company are: President, Bernard F. Webber; Vice Pres. and Supt., F. W. Lebahn; Sec'y, F. W. H. Sundmacher; Treas., A. S. Wehrheim.

Jas. Means & Co., Steubenville, Ohio, have in course of construction, Dry Pan, Pug Mills, and other heavy clayworking machinery for Franklin Paving Brick Co., Franklin, Pa.; Mellon Fire Clay Co., Freedom, Pa.; Jud. Taggart Brick & Tile Co., Scio, Ohio; Nicolls & Matthews, Wellsburg, W. Va.; and Bibbville Fire Brick Mfg. Co., Bibbville, Alabama.

H. Fisher, Lynchburgh, Va., has a large tract of valuable clay land near Salem, Va., and will form a company to establish paving brick and sewer pipe works. Mr. Fisher thinks there is a good opening there for a large plant, for there is no factory of the kind in that section and there is a large and growing demand for both brick and tile, good shipping facilities, cheap fuel, etc.

Pike & Castle, Chenoa, Ill., builders of the New Discovery Kiln, write that they are crowded with work. They are now building kilns at Milwaukee, Wis., Streator, Ill., Asheville, N. C., Tacoma, Wash., Stamford, Conn., Bridgeport, Conn., Boston, Mass., Farlow, Ill., Guthrie Center, Iowa, Nashville, Ill., Jefferson, Wis., and East Palestine, O. At the latter place they are putting up twenty 26 ft. kilns.

In a paper read before a recent meeting of the Minneapolis Engineers, Mr. Rundlett stated that the annual production of brick in Minnesota was from 50,000,000 to 60,000,000, of which about 30,000,000 was manufactured in Chaska. He said there was not enough brick manufactured in the state to supply the demand and large quantities were imported from Wisconsin, Illinois Missouri and other States.

It is the opinion of Philadelphia brick makers that a strike among the hands would be hailed with joy by many, especially those who have been cutting and slashing prices in order to get business, and who now find themselves short in pocket in consequence. Contractors who have been faithful to their own interests the past few years, have made money, but those who have labored for the sake of labor, now find themselves behind in the race.

WHAT

do you think of a brick-maker who fails to surround himself with approved appliances for making brick?

HOW

is he to compete with his neighbor who operates a Raymond Power Re-Press?

WHY

He Can't

H. H. Daniel, Columbus, Ga., is going into the brick business and will be pleased to receive circulars and catalogues of machinery, kilns, etc., etc.

Clinton Stephens, of South Bay, Madison Co., N. Y., writes that he intends to engage in the brick and tile business and desires information relative to the best machinery and appliances for such purposes.

A strange but very important incident occurred last week on one of the largest brick yards in the United States., that of The John Porter Co., of New Cumberland, W. Va. Mr Porter, who is well known to our readers, had been operating a very peculiar machine to re-press his paving blocks and fire bricks, which, as far as could be seen, was working satisfactorily; suddenly and without warning Mr Porter left the press, went to his office and ordered nine more. Messrs. C. W. Raymond & Co have the order.

Trade with the Morgantown Brick Co. of Morgantown W, Va., has increased so rapidly that they have been unable to fill their orders for brick, which they have been making by hand, so they have placed an order with C. & Potts & Co. for one of their Horizontal Stock Brick Machines, No. 2 A. Disintegrator, Mold Sander and engine and boiler. They have a very fine clay and there is no doubt but what they will make a superior brick to any made in that section of the country.

The King-Hill Brick & Mfg. Co., of St. Joe, Mo., are going to increase their capital stock to \$100,000, and enlarge their already extensive building and paving brick plant. They now have an annual capacity of 15,000,000. They are turning out an unusually fine grade of vitrified paving brick. At a recent test made by the Kansas City authorities to determine the crushing strength of brick from a dozen or more factories the King-Hill brick carried off the honors, showing the remarkable crushing strength of 143 tons to the square inch.

On April 1st. 3,000 brick makers went out on a strike at Philadelphia, leaving but three out of the 60 brick yards in the city at work. A meeting of the Clay Assembly No. 6789, was held on March 31st, when it was stated that the Manufacturers Association, who refused to arbitrate, had decided to substitute the schedule of 1889, which means a reduction of about 10 per cent or 25 cents a day. The impression prevails generally that the trouble will be amicably arranged between employe and employers and that too, speedily.

Jonathan Creager's Sons have recently booked orders for machines to Jno. R. and W. W. Price, Monterey, Mexico; one complete plant, including Atlas engine and boiler, to Radford Pipe and Foundry Co., Radford, Va. Same style plant to W. J. Tracy, New Orleans, La. Plant to Kritenbrink & Bro., South Omaha, Neb., including engine and boiler. Plant for fire brick for Watts Steel and Iron Syndicate, Limited, Middlesborough, Ky.

A third outfit to Crawford Red Brick Co., this last plant to be located at Nobles Siding. Plant, including engine and boiler, to Geo. C. Goodell Brick Co., Clifton Forge, Va. Machines to Altemus Bros., Plaquemine, La., and Heitger & Sons, Bedford, Ind.; one Improved No. 4 Disintegrator to Watertown Pressed Brick Co.; one complete plant Brick Machinery to Portsmouth (Ohio) Red Brick Co.; complete plant to Clinton (La.) Brick and Tile Co.; second machine to W. H. Surlis, E. Liverpool, O.; complete plant to McDonald & Bro., St. Louis, Mo. The above sales were all consummated by correspondence and Messrs. Creager always desire that their communications be accepted as a personal visit from them.

The Wheeling Paving Brick Company, of Wheeling, W. Va., are sending some excellent vitrified brick to Philadelphia. The brick are very hard and much larger than Philadelphia brick, consequently it wears and gives the very best satisfaction. Chester Avenue, and several leading streets in West Philadelphia were paved with the brick about two years ago, and although there is considerable travel in that direction, the brick show but little wear. Several other leading highways will be paved with the same make of brick this spring. The highway commissioners and builders are of the opinion that the brick has come to stay.

Quite a furore was occasioned at the Peerless Co.'s Brick yard March 26th in consequence of a publication in the Public Ledger that the Co's hands to the number of 183 were to demand an increase of wages on April 1st, and if not acceded to, a general strike would be the result. The employes held a meeting the following day and adopted resolutions stating that they have always been and are now paid the desired wages agreed on, both during the brick making season and during the winter when other yards are closed, and have no fear now of a reduction; as they have always been treated with the greatest fairness and consideration.

A BUSY FACTORY.

WE visited the works of C. & A. Potts & Co., a short time ago, and found them busy with the various lines of clayworking machinery. Mr. Potts informs us that they have been turning out three complete brick machine outfits, including their Horizontal Stock Brick Machine, Disintegrator, Mould Sander, and Elevator, each week since the 1st of February, and that they were that day loading the only machine then on hand, for the Standard Brick Co. of Milwaukee, Wis. They have a capacity of one No. 2 A. Disintegrator every day, three No. 3 A., and one No. 4 machines each week, and, notwithstanding the fact that they purchased a number of special tools for the manufacture of their Mould Sanders, which enables them to make two of the above machine each day, there was not a Sander in sight, all having been shipped

the day before our visit. We were surprised at the amount of work being done by this firm as well the improvements they have made in their plant the past year, they having erected a large foundry which is equipped with latest improvements including an electric crane.

Messrs. C. & A. Potts & Co. started in a small way several years ago, with a capacity of three Disintegrators each week. By energy and close attention to business and the production of good, well built machinery that does all that is claimed for it, they have built up an extensive trade of which they may well be proud.

KILN PLANS.

As numerous brickmakers throughout the country have written for information about the down-draft kiln, which I have used so successfully during the past twenty years, I have prepared complete building plans and specifications of my central flue, round down-draft kiln, with improvements suggested by experience, blue prints of which I will forward for a small sum. Address P. Arnold, Supt. Dover Fire Brick Co., Canal Dover, Ohio.

A Victory for the Wagner Vestibule.

The Wagner Palace Car Company, operating Sleeping cars over the Big Four ROUTE, has gained a signal victory in its controversy with the Pullman Company. By the decision just rendered by Judges Gresham and Blodgett, in the United States Circuit Court at Chicago, the motion made by the Pullman Company to enjoin the Wagner Company from the use of the "Vestibule" is denied, and the Wagner Company is sustained on every point it has made in the contest. This decision practically disposes of the litigation, and leaves the Wagner Company a clear field in which to demonstrate the superiority of its perfected Vestibule, which is now in use on all express trains of the Big Four ROUTE, making the trains practically solid from end to end, an advantage that will be readily appreciated by the traveling public.

Those wanting situations or experienced help should keep an eye on our "Wanted, For Sale, Etc.," columns.

A WISE MAN ONCE SAID

"In less than four hours after reaching our works, your Automatic Power Press was in operation and has been ever since. We have two of your Power Presses now in use, and congratulate you, as well as ourselves, on the wonderful improvement you have made. We have spoken words of praise and advised our friends in the brick business to buy one of your re-presses."

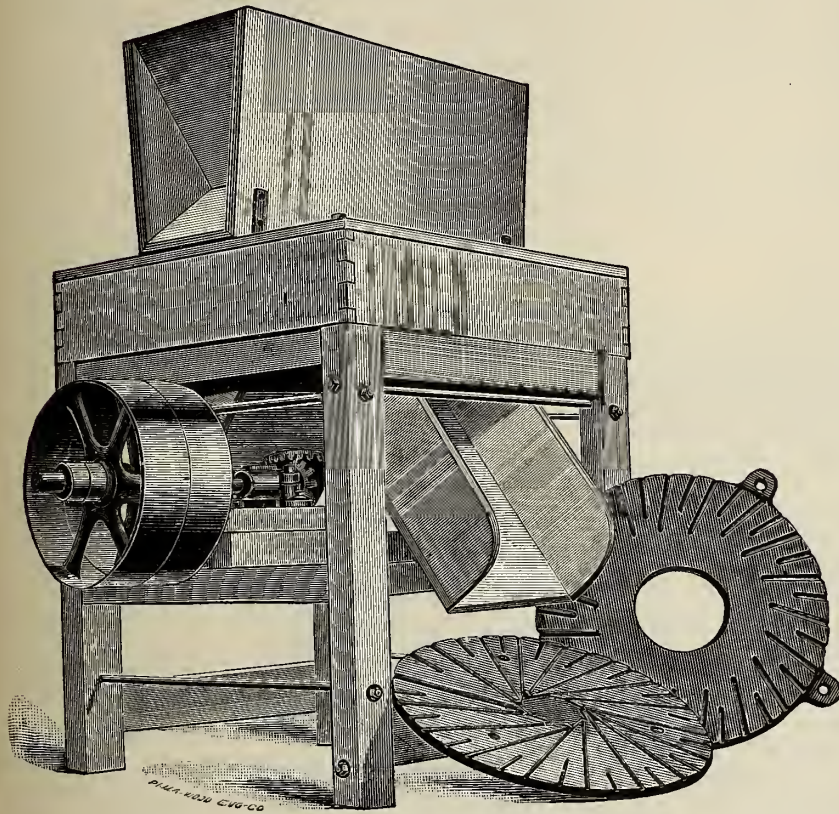
Winslow & Co., of Portland, Me., Firebrick Manufacturers, March 10th, '91, to C. W. Raymond & Co., Dayton, O.

THE STANDARD SAND GRINDER.

FOR GRINDING MOULDING SAND.

A GREAT ECONOMIZER.

No more pounding sand! No more waste sand!



It sieves and grinds all hard lumps.

Less than one-half the sand you use now will do you with the Grinder.

A boy can grind enough sand in 2 hours to do a large brickyard a day.

The sand can be used directly from the Grinder for common brick without sieving.

It will pulverize soft-burned brick, thus making it valuable in localities where there is no sand.

It requires less than one-horse power to run it.

It does not break the grain of the sand.

FRANK B. McAVOY:

Dear Sir—I have been using the Standard Sand Grinder 3 years. It is a great economizer of time and sand. It saves the price of itself in a short time. It is simple and inexpensive. It does not break the grain of the sand. Every brickmaker should have one.

Yours Truly, CHAS. B. Siner.
Philadelphia, Pa.

FRANK B. McAVOY:

Dear Sir—I have been using the Standard Sand Grinder during the past season. It saved the price of itself in 3 or 4 months. It is simple and easily handled. I would not be without mine at any price. Great saver of time and fuel.

Yours Truly,
Philadelphia, Pa.

SAMUEL HUHNS.

For further information, apply to

FRANK B. McAVOY,

22nd and Mifflin Sts.

PHILADELPHIA, PA.

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Keeping Up With the Times.

The FREY-SHECKLER Co., Bucyrus, Ohio, are enjoying an enormous trade in their large variety of Clay Machinery, nearly three times as large in January and February as during the same months in any preceding year.

The most notable increase is in Dry Pans, Pug Mills and Auger Machines suitable for making Street Pavers.

It is now fully established by numerous trials that first-class pavers can only be made by an Auger Machine. It is also an interesting fact, that over 60 per cent of all pavers made in the United States are produced by the Frey-Sheckler Co's. Auger Machine.

It puts more clay in a cubic inch than any other method.

It works clay at just the proper temper to make a uniform, homogeneous brick.

All parts liable to break are made of steel. It makes as many brick in a day as can be taken care of. It has with it, as an essential accessory, the Neidergesaess patent lubricating die, which makes smooth surface, square corners, saves power and lamination.

Another new creation that is finding favor with Brick-makers is the new patent cutting table. It is adapted to either side or end cut brick and its capacity fully 20 per cent. above any hand table heretofore used. The column of clay keeps constantly moving, is cut into side or end cut brick whilst in motion, and leaves no fragment to be thrown back into the brick machine.

It is too strong to break and constitutes an important complement to their excellent sets of brick machinery.

The substitution of a short, polished plate with a lubricating roller at each end, for the six or eight rollers that usually carry the column of clay from the die to the cutting table, is also a popular improvement by which the handling and frequent cleaning of the sticky rollers is avoided.

The two rollers really bear none of the burden of the column of clay, but only roll gently on its under side, spreading over its surface a thin coat of crude lubricant which they carry from the oil reservoir in which they run.

The company has several new and improved machines which they will introduce to the fraternity during the summer.

Their clayworking experimental station which they have erected during the past year at Bucyrus, Ohio, at a cost of over \$50,000.00 enables them to thoroughly test their new inventions before sending them to their customers' brickyards.

The interesting 29th Annual Catalogue of the Frey-Sheckler Co., Bucyrus, Ohio, will be sent free upon application.

See ad. on page 472.

THE CLAY WORKER.

VOL. XV.

INDIANAPOLIS, IND., MAY 15, 1891.

No. 5

Written for the Clay-Worker.

EXAMPLES OF AMERICAN BRICK AND TERRA COTTA WORK.

No. 37.

A TERRA COTTA TABLET.

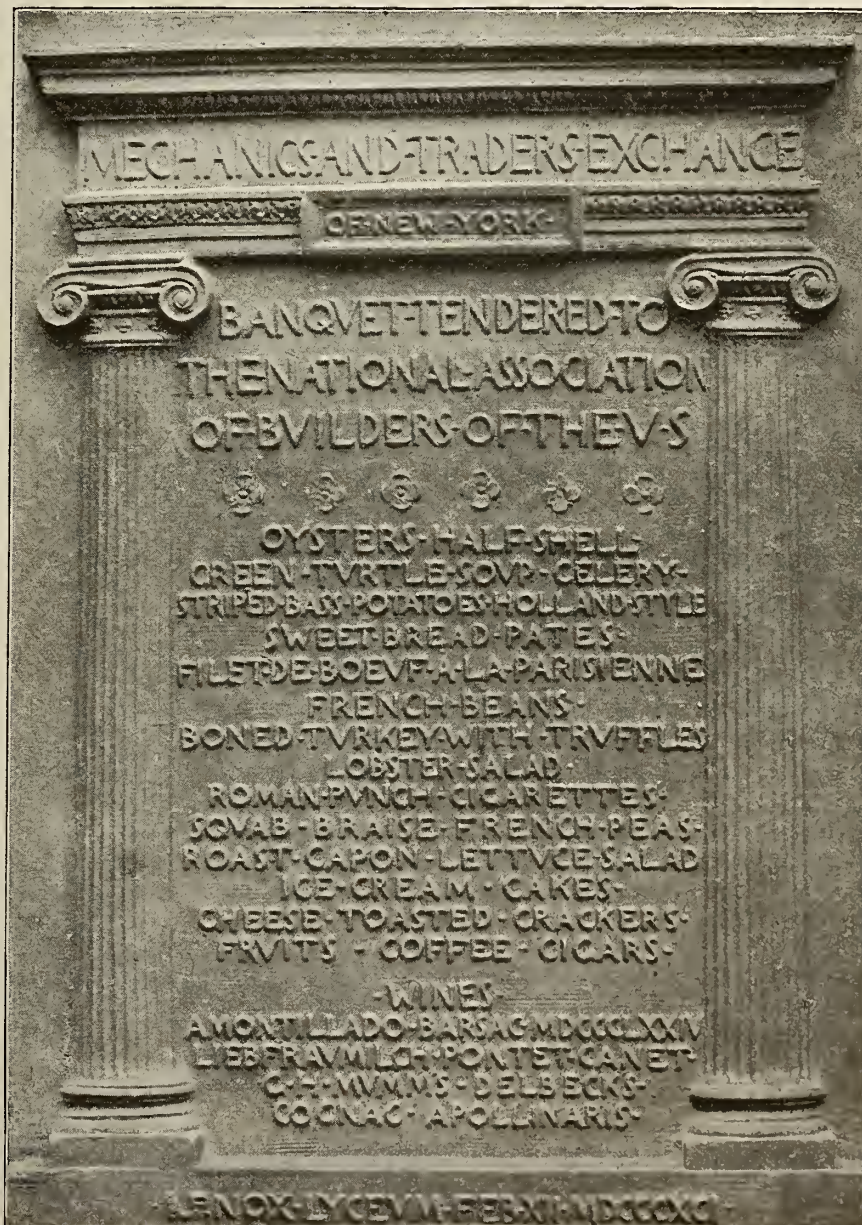
THE accompanying engraving of the novel souvenir presented to those who attended the recent annual banquet of the National Association of Builders, by the Mechanics' and Traders' Exchange of New York City, will be of more than passing interest to our readers, inasmuch as it indicates the adaptability of burned clay to art work in a field but little cultivated. The menu of the banquet was neatly inscribed on a dark red terra cotta tablet six by eight and a half inches square and a half inch thick. They were made by the Perth Amboy Terra Cotta Co., of Perth Amboy, N. J., and were very much admired by every one as being both unique and pretty.

MEASUREMENTS made at some of the brickyards in Findlay, O., indicate that the amount of gas used to burn a thousand cubic feet, independent of the amount used for power in preparing the material. The rates have been as follows: For brick burned in open kilns twenty-five cents per thousand, and for brick burned in closed kilns, twenty

cents per thousand. At Fostoria the rate is fifteen cents per thousand. At Tiffin the rate has been fifty cents per thousand. The charge for seven drain tile kilns at Tiffin is fifty dollars per month. It is estimated that the consumption of gas in brickmaking alone, at Tiffin, is not less than one million feet per day during the busy season.—*National Builder and Architectural News.*

WHOEVER owns a town lot is apt to be looking forward to the time when he will erect upon it a dwelling, and at first blush he thinks he will be satisfied with a house of extremely moderate cost. This might be the correct thing to do if only his present monetary affairs were to govern, but there are other considerations which should not be overlooked. Perhaps the property is your chief possession, and you may have reason while

you live to wish its value were increased. You may need to rent or sell, or your children who come after you may be obliged to do so. Which do you think will most increase the value of the property—a poorly built, cheap house, or a substantial, attractive and comfortable one? Which will sell the easiest? Which will rent for the most? Which tends to raise the value of property in a community—good and tasteful dwellings, or flimsy and common-looking concerns? We say to every lot owner: When you set about the improvement of your property do your level best to put up a good building, for when completed it is there to stay and will give you satisfaction. A first-class house is almost like a deposit of gold in a sound bank. You can always sell it or rent it at the highest market price. Everybody wants to live in a good house; nobody desires a poor one.—*Ex.*



THREE POEMS ON OPPORTUNITY.

By Senator Ingalls, the Late Edward Rowland Sill and "H. H."

Master of human destinies am I!

Fame, love and fortune on my footsteps wait.

Cities and fields I walk; I penetrate

Deserts and seas remote, and passing by

Hovel and mart, and palace, soon or late

I knock unbidden once at every gate!

If sleeping, wake; if feasting, rise before

I turn away. It is the hour of fate,

And they who follow me reach every state

Mortals desire, and conquer every foe

Save death; but those who doubt or hesitate,

Condemned to failure, penury and woe,

Seek me in vain and uselessly implore

I answer not, and I return no more!

—Senator Ingalls, in *New York Truth*.

Opportunity.

This I beheld or dreamed it in a dream;

There spread a cloud of dust along a plain,

And underneath the cloud, or in it, raged

A furious battle, and men yelled, and swords

Shocked upon swords and shields. A princess' banner

Wavered, then staggered backward, hemmed by foes.

A craven hung along the battle's edge

And thought, "Had I a sword of keener steel—

That blue blade that the king's son bears? But this

Blunt thing!" He snapped and flung it from his hand

And lowering, crept away and left the field.

Then came the king's son, wounded sore bestead,

And weaponless, and saw the broken sword,

Hilt—buried in the dry and trodden sand,

And ran and snatched it, and with battle shout

Lifted afresh, he hewed his enemy down

And saved a great cause that heroic day.

—Edward Rowland Sill.

Opportunity.

I do not know if, climbing some steep hill,

Through fragrant wooded pass, this glimpse I bought,

Or whether in some midday I was caught

To upper air, where visions of God's will

In pictures to our quickened senses fulfill

His word. But this I saw. A path I sought

Through wall of rock. No human fingers wrought

The golden gates which opened, sudden, still.

And wide. My fear was hushed by my delight

Surpassing fair the lands; my path lay plain

Alas, so spellbound, feasting on the sight,

I paused, that I but reached the threshold bright,

When, swinging swift, the golden gates again

Were rocky wall, by which I wept in vain.

—Helen Hunt Jackson.

Written for the Clay-Worker.

SAVING BY IMPROVED ENGINES.

BY PROF. R. C. CARPENTER.

THE question of cheap power can have no greater import to any class of men than to the brickmakers and workers of clay generally, yet it is probable that no class of men who use power to an equal amount have paid as little attention to this particular point, unless it may be the owners of saw mills; at least such is the conclusion that I have arrived at from visiting a number of clayworking establishments. It is prob-

able that the owners have not thought of the saving that might be produced by the improvements that have been made in recent times in steam engines, for the engine most usually seen is a slow moving one and an old-fashioned D or slide valve. It is true that this old type of engine is reliable and not likely to get out of order, but so, indeed, is the best type of the improved engine that is on the market. The improved engine will probably run with as little care, although it is evidently not good policy to neglect any engine or other piece of machinery. In order to show that the saving is not entirely hypothetical I present here the tests of two engines of the same size and doing the same work as nearly as possible on alternate days, one of these engines was a simple slide valve engine in perfect condition, the other was an automatic with a balanced valve, both being non-condensing. The automatic was built by the Lansing Iron Works of Lansing, Mich. The test was made for the purchasers of the engine, and not for the engine builders.

The test showed a saving of more than two and one-half pounds of coal per horse-power per hour by the improved engine. This small saving for a hundred horse-power engine means one and one-fourth tons per day of ten hours, or at least 450 tons per year. This means in

cash all the way from \$500 to \$900 depending on the price of fuel.

The less figure is probably at least 25 per cent. of the full cost of the improved engine, while the higher figure is a much larger per cent. and represents quite a comfortable addition to the revenues of the yard. Where condensing engines can be used the saving could still be farther increased by at least twice the amount given here. From this test it is seen that the old slide valve engine required 8.93 pounds of coal per horse-power per hour, the automatic 6.3 pounds; a condensing engine would easily have given a horse-power on 4 pounds of the same kind of coal, while a compound condensing would have required only 2½ or 3 pounds per horse-power per hour.

The use of a condensing engine is only possible when there is plenty of water to be obtained, as 600 to 800 pounds of water are necessary to condense the steam for each horse-power per hour. This amount means about 7,000 gallons per hour for a one hundred horse-power engine, and when such an amount can be obtained, the compound condensing engine will soon be a profitable investment.

The test is very instructive, and shows distinctly how much money is frequently wasted in maintaining and making poor machinery.

COMMON SLIDE VALVE ENGINE 16 INCH DIAMETER BY 24 INCH STROKE.

TEST FOR E. BEMENT & SON, OCT. 27, 1888.

No.	Time A. M.	Revolutions per Minute.	I. H. P. Indicated Horse Power.	Boiler Pressure. Pounds.	Water Rate per I. H. P.	Remarks.
2	8:25	109	66.7	70	37.5	Fifty pound spring.
3	30	109	66.6	76	39.7	
4	32	108	61.6	78	39.1	
6	45	106	57.9	72	39.1	
7	55	108	64.8	70	36.4	
8	9:10	106	59.8	75	37.5	
9	20	106	59.9	75	34.6	
10	38	106	67.5	65	33.8	
11	45	108	67.8	60	35.9	
12	55	106	69.4	70	34.7	
13	10:05	108	68.4	70	33.9	
14	20	108	63.6	69	38.2	
15	28	108	64.0	70	37.3	
16	38	108	62.1	75	35.6	
17	45	110	61.7	70	36.4	
18	55	108	69.7	70	34.7	
19	11:05	104	66.2	68	36.5	
20	15	106	67.1	75		Average 64.65 I. H. P., 36.4 Water Rate.
21	25	106	64.9	69	35.6	
22	32	105	67.0	58	34.7	
<i>Machines disconnected—Engine and shafting only.</i>						
23	34	111	39.2	56		Averages of No.'s 23, 24 and 25, 37.30 [I. H. P. Cords 1, 5, and 26 to 30 lost.
24	35	110	38.2	56		
35	36	111	34.6	56	61.4	
<i>Main belt removed—Engine alone.</i>						
31	55	116	13.3	60		Twenty pound spring.
32	56	116	14.1	60		
33	58	115	13.3	59	122.7	Average 14.7 I. H. P.
34	12:00	115	14.0	58		
AVERAGE RESULTS.						
			64.65		36.4	Engine at work.
			37.30		61.4	Engine and main shafting.
			14.67		122.7	Friction of engine.

FUEL TEST.—3,805 pounds of coal was burned in 4 hours and 45 minutes, or at rate of 801.05 pounds per hour. This coal was used to drive engine tested and a 25 horse-power engine in the blacksmith shop. This gave a consumption of 8.93 pounds per I. H. P.
Actual water used could not be measured.

In the accompanying tests are given the revolutions of each engine, the Indicated Horse Power (I. H. P.) obtained during the test, the Boiler Pressure in pounds, and the water rate per Indicated Horse Power, which is the amount of water in pounds required for each horse-power of work done, as shown by the Indicator Cord. This amount being much less than the actual water consumption, and showing somewhat more favorably for the old and more wasteful engine, than the fuel consumption; this is a reasonable result.

**AUTOMATIC ENGINE 16x24 INCH STROKE—
LANSING IRON AND ENGINE WORKS.**

TEST FOR E. BEMENT & SON, NOV. 3, 1888.

Number.	Time.	Revolutions.	Boiler Pressure. Steam Pounds.	I. H. P.	Water Rate.	Remarks.
1	7:38	185	81	84.2	30.8	
2	48	180	70	90.6	29.3	
3	55	185	70	90.0	30.5	
4	8:03	178	70	87.0	30.5	
5	10	183	70	89.7	28.9	
6	18	178	77	94.5	30.3	
7	30	184	73	94.9	27.9	
8	43	180	75	84.5	28.9	
9	55	182	75	84.4	30.3	
10	9:06	175	73	84.5	30.9	[at work.
11	28	180	77	91.1	27.4	[blacksmith shop
12	37	182	78	84.7	30.3	Cord taken when
13	56	178	68	85.3	27.6	—Oven—
14	10:05	180	75	84.1	28.4	
15	20	180	75	85.7	29.5	
16	30	175	72	91.1	26.4	
17	45	170	70	89.1	28.4	
18	55	173	70	86.3	30.3	
19	11:03	173	68	92.5	29.5	
20	13	177	73	89.2	27.9	Average water
21	25	180	65	85.6	Lost.	rate (connected)
22	29	176	65	74.8	33.2	29.2
Average.....					87.0	

AVERAGE RESULTS—AUTOMATIC ENGINE.

Number.	Time.	Revolutions.	Steam Pounds.	H. P.
<i>Engine and shafting, no machines at work.</i>				
23	11:36	184	65	46.8
24	37	186	64	48.3
25	38	186	63	45.0
				46.7 Average H. P.
<i>Engine belt off.</i>				
26	11:43	188	67	18.7
27	44	188	67	18.2
28	45	188	67	19.6
				18.85 Average H. P.

Fuel used in this test was 3,330 pounds.

This fuel burned 4 hours and 55 minutes, or at rate of 687 pounds per hour.

This steam drove engine in blacksmith

shop..... 25 H. P.

And engine tested..... 87 "

Total..... 112 "

The coal burned per H. P. 6.32 pounds.

In test of Oct. 27, 1888, 3,805 pounds of coal was burned in 4 hours and 45 minutes, or at rate of 801.05 pounds per hour, or 8.93 pounds per H. P.

Economy of new engine over old engine by fuel test is 29.1 per cent.

The good condition of the common slide valve engine is shown by the fact

that the friction of the engine is less than that of the automatic engine; it being in the one case 14.07 I. H. P. as against 18.85 in the other, this excess of friction being due, no doubt, to the fact that the automatic engine had not been in use so long. The term automatic is in common use by engine builders and refers to that class of engines in which the governor is attached directly to the valve, so that the steam entering the cylinder is reduced in pressure very little if any below that in the boiler; the amount of steam admitted is automatically regulated in order to maintain a constant speed, by the action of the governor, in holding the valve open for a longer or shorter time as may be required. In the other class of engines the valve moves the same, regardless of the speed, and the governor is not a part of the engine and regulates the speed by throttling or reducing the pressure of the steam. The foregoing explanations will, no doubt, serve to explain the character of the engines referred to and their essential points of difference. It is not in general supposed that the difference in the economy of these two classes of engines is as great as shown in these tests, and many believe that the sole advantage of the automatic engine lies in the fact that it is better governed, and that the same size develops more power. It is true that the difference may not always be as great as shown in these tests, but I have recently seen a number of such tests made, and the gain has rarely been less than, 25 per cent., so that in general there is little doubt but the gain shown by the tests is close to the average. The test was particularly good in the case cited, because of the excellent condition and workmanship of both engines. The automatic engine built by the Lansing Company is favorably known throughout the West, and needs no detailed description. The late form being especially close regulated and well built. The common slide valve engine of the test was well built and apparently twice as heavy, and had the advantage in this especial test of being better liked by the engineer in charge and by the foreman of the shops. These men liked the old fashioned ways better than the new, and did what they could to make the old engine show a better record than the new one. This is shown well by the fact that the work put on to the automatic engine was a third more than that on the other, and this in spite of the

strict orders of the proprietor, who desired the same work done each day.

In one or two instances of such a change of engines that has come to my attention the increased capacity of the new engine led to a corresponding increase in the output which was not realized by the proprietor. The result was to lead him to think, that because his saving in coal was small, he was not realizing the saving that was promised. In one instance a special expert was called in, at considerable expense, to ascertain the exact amount of saving resulting from the change. In every case both parties were convinced of the economy of the automatic engine, and no further questions were raised.

A CLAY-WORKER SCRIBE ABROAD.

Vitrified Paving Brick.

I HAVE just received reports of the Brickmakers' Convention at Indianapolis, and am more than pleased by what was said about paving and vitrified brick. I have been preaching a good deal, with vitrified brick as my text, since I have been on this side of the water, and I am glad to see that there is a movement in the direction of their manufacture at home. Vitrified brick is the only clean thing that can go into a building. It is the only clean thing that can be used for street paving. It is clean because it is non-absorbent. Stone, wood, plaster and all other material will absorb a large proportion of the nastiness that comes in contact with it. It will take it up until it is full and then give it out in foul exhalations brought about through the changes in temperature. Vitrified brick is clean, perfectly, absolutely clean. There is nothing so rank or rotten that can effect it. Filth may be piled against it but none goes into it. A little water and a minimum of energy and all evidences of bad company are removed. All that brickmakers have to do to market a vitrified brick is to make them and sell them at a fair price.

If I were going to market a paving brick I would say for it that it was the only clean pavement in existence, and there would be no trouble in proving it. This one merit of a brick pavement is enough so establish its success. The greatest thing that may be done for people who live in cities is to contribute to the cleanliness of their surroundings. Along this line much remains to be done. Think of living next to a wooden pavement! What is there that can hold

more filth than a wooden block? Excrement, dust, the urine of horses, water and a block pavement and we attain the acme of nastiness. A stone pavement is little better. The joints, as well as the stone itself, can hold a great deal that is foul. Asphalt is better than either of these, but as regards cleanliness a glazed brick is nearer perfection than anything else. A brick pavement is the most sanitary pavement that one can imagine.

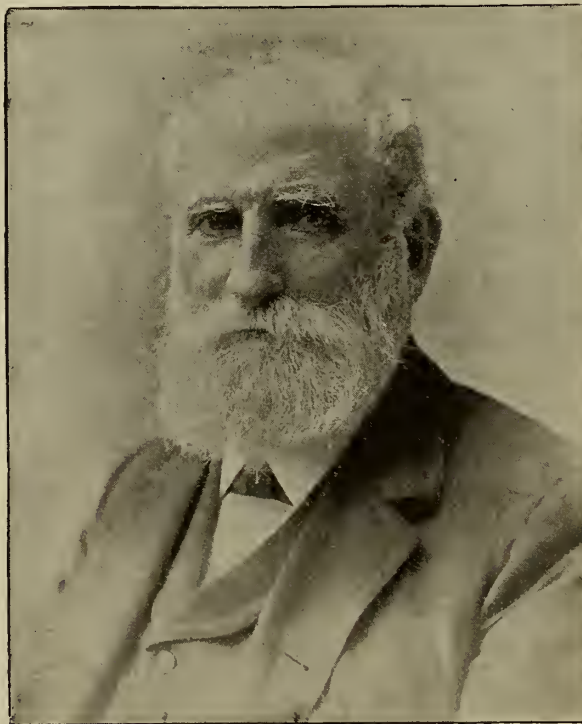
GOOD FOUNDATIONS NECESSARY.

I have been reading what a good many people have to say about a foundation for a brick pavement, and as I have seen something in the way of paving in general on this side, as well as at home, I shall feel free to express myself. Some of our people who are interested in brick pavement are going to make a mistake, and in that way injure the business of making paving blocks. They are figuring on cheap foundations, sand foundations, cinder foundations, and all that. This will not do. I have seen many block pavements on this side, not brick, but wood and stone, and I have not seen any which are successful unless laid on concrete. It is not possible to say exactly how deep a foundation should be. This depends a good deal upon the character of the soil. Certainly for a street the concrete should not be less than seven or eight inches. It should be worked smooth on the top and then the brick laid in cement mortar on top of that. Little attention need be paid to a bottom bed, but between the bricks they should be slushed in solid. I see that some of our friends recommend a two-inch bed of sand over the concrete for the purpose of securing elasticity. I do not believe one will get much elasticity out of a pavement that has a good foundation under it. However, I have seen a way they have of laying stone block pavements here in Paris, which I think might meet this case. Consider brick with a two-inch bed of sand over the two concrete foundations recently mentioned. Then make a slush of Portland cement and work it into the joints as long as it will run. Before this is done, however, I think it well to lay the brick close together, which, however, will not prevent the cement slush from having its proper effect.

I hear it said that all this will make

an expensive pavement. Of course it will. But a brick pavement is not cheap under any circumstances, and if one undertakes to make it less expensive by putting it on a poor foundation it will be a failure from the start. Brick pavement will succeed as a high grade pavement if put down in a high grade manner. It can never succeed as a cheap pavement. The public is not asking for cheap pavements; they want them good.

Some of our friends may say that I have not seen brick pavements on this side, and that what I have to say about the foundation does not apply in the case of brick. That is a mistake. It makes no difference what material the



S. P. CRAFTS, NEW HAVEN, CONN.,
Vice-President National Brick Manufacturers' Association.

surface is made of. A first-class foundation is imperative. I know that a wooden block pavement on sand is a failure. I know that the same thing is true of granite or other stone. I know that both of these blocks, stone and wood, have a larger bearing than brick. I know that if a sand foundation is a failure under stone or wood that it is a failure under brick. In Glasgow, Liverpool, London, or Paris, the history of paving is very clearly set forth, and it is as I have given with respect to the matter of foundations.

I have walked over brick sidewalks all my life, and never yet saw one that was uniform or smooth. In making a brick covering for sidewalks there should first be the bed of concrete four inches in

thickness and then the brick laid flatways in cement on top of that. There should be a slight slant to the gutter curbing. The concrete can be made of broken brick, sand and cement, as long as bats are accessible, or when the bricks are cheaper than stone. Portland cement is certainly better than any other, but a good grade of domestic cement is probably good enough for this purpose. The lower bed of concrete may be coarser than the top convening, which should partake of the character of a cement mortar put on in a separate layer in order to give an exactly uniform bed.

The principal advantage in running a cement slush between the brick is that it will have the quality of preventing the interstices from becoming filled with foul material. Anything which we can do to add to the sanitary character of a pavement will add to its popularity and value. Advocates of brick pavements should bear in mind that it is *the* clean pavement.

The discussion about vitrified brick, glazed brick, enameled brick and what not, opens up a new field to the clayworker. What architects and all good builders want is an impervious clay product. It can be used for paving, not only on the streets, but courts and hallways, for lining kitchen walls, water closets, bathrooms and places of that kind. In doing this work these brick can be built in as the building progresses and thus be an integral part of it.

ROOFING TILE.

Not only does the vitrification and glazing develop this but the experience in doing it will make it possible for all clayworkers engaged in the manufacture of vitrified brick to work up a roofing tile. Clayworkers do not appreciate what there is before them. A tile covering is the one material which is in all respects suitable to go on a roof. It may be made impervious to moisture; it is an absolute fire protection which no other roof covering can even claim to be. Slate goes like dew before the sun in a case of fire. Tile is not effected by it.

Tile roofing is very largely used in Paris and all through the country. It is a cheap and beautiful covering. It adds an artistic quality to any structure on which it is placed. Opposite the house in which I live there is a tall wall surrounding a convent garden and build-

ings. Notwithstanding the wall is of stone and over two feet thick it has a tile coping. This adds an artistic quality to its appearance which it would not otherwise have. LOUIS H. GIBSON.

Paris, March 20, 1891.

Written for the Clay-Worker.

THE FUEL QUESTION.

No. 7.

GASEOUS FUELS, HYDROGEN, WATER-GAS, NATURAL GAS, ETC.

DEAR WILL:—I am not at all surprised at your craving after a fuel like hydrogen gas, but am sorry to disappoint you by informing you the hydrogenous period of this globe has passed away, and hydrogen in the free state is a thing of the past. We find it combined with other gases, liquids and solids, and we may separate it from these by well known methods; but for ordinary fuel no method is yet known that will generate it cheap enough. It is, without question, a very fine fuel when supplied in sufficient quantities; one pound of this gas contains 62,000 heat units—I have stated in former letters 64,000, but this is incorrect—and will therefore furnish as much heat as about $4\frac{1}{2}$ pounds of good coal. I have told you that hydrogen is the lightest body known; one pound at ordinary temperature and pressure would make a globe 7 feet in diameter, whereas, the $4\frac{1}{2}$ pounds of coal would make a globe about $5\frac{1}{2}$ inches in diameter. The hydrogen then is 3,448 times as large as the coal; 1,000 cubic feet of hydrogen is equal in heating power to 24 pounds good coal, and comparing the value of the hydrogen with the coal at \$2 per net ton, 1,000 cubic feet would be worth 2.4 cents, or not quite 2.5 cents. I want you to follow me very closely in this, and note every point. One ton of uncompressed hydrogen—that is having only common atmospheric pressure—would fill a gas-holder 120 feet in diameter and very nearly 32 feet high; it would be equal in heating power to $4\frac{1}{2}$ tons of good coal; let us say 5 tons of such coal as you use under your boilers; you will now perceive you will have to fill the above sized gas-holder twice to run your boilers 24 hours. This is, also, about the quantity that would be required daily to burn a kiln of 200,000 bricks.

I think it will begin to dawn on you that this almost universally coveted fuel is, after all, attended with some serious drawbacks. To render it effective,

a large quantity must be consumed.

It may surprise you to be told that for equal volumes, carbonic oxide is very nearly equal to hydrogen in heating power, the latter being only 2 per cent. higher; you must, also, take into consideration the fact that carbonic oxide contains in its composition only three-sevenths of combustible matter, while the hydrogen is entirely combustible.

The hydro-carbons rank much higher for equal volumes than hydrogen; take, for instance, marsh gas, also named methyl-hydride, methane and light carburetted hydrogen. One thousand feet of this gas is equal to 3,000 feet of hydrogen; and heavy carburetted hydrogen—also named olefiant gas and ethylene—contains nearly five times the heating power as the same volume of hydrogen.

If we compare the hypothetical, or supposed carbon vapor, with hydrogen, the carbon vapor contains for equal volumes more than twice the heat of hydrogen. These comparisons will suffice, I think, for the present, and are given merely to show you that this much coveted hydrogen is not by any means the best fuel to burn by volume, and gases, you know, are usually sold by meter or measure, not by weight.

No known process for the generation of hydrogen can as yet put it on the market as a general fuel, nor illuminant.

The simplest method I know for its generation, pure and simple, is by dissolving zinc in dilute sulphuric acid. Take $65\frac{1}{4}$ pounds zinc and 98 pounds sulphuric acid and you will, by dissolving all the zinc, generate 2 pounds of hydrogen gas, or it will require $180\frac{1}{2}$ pounds of zinc and $271\frac{1}{2}$ pounds of sulphuric acid to generate 1,000 feet; now zinc at 3 cents per pound and sulphuric acid at 2 cents per pound would make the gas cost \$10.84 per 1,000 feet for material alone; and this gas, I may repeat, would be equal to 24 pounds of good coal. There would, however, be 452 pounds of sulphate of zinc to be credited up to the hydrogen. There are other methods of producing this gas which you may find in any elementary work on chemistry; and, bye the bye, I would like you to read up a little more chemistry, and, for that matter, Natural Philosophy, in general. You would derive double the benefit from these letters if you were better grounded on the above named subjects. My fear is you will fail to comprehend all I tell you, and thus lose the most valuable portion, perhaps. It is very essential that you should have

a good store of general information to guard yourself against popular errors; for instance, how frequently we hear of electricity as the coming motor that is to supersede steam. I was in a printing office not long ago, where the printing presses and other machines were run by an electric motor; the proprietors were very proud of their motor and liked it much better than the small steam boiler and engine it had replaced. They were evidently under the common impression, that the days of steam are numbered; when I had seen their compact and well arranged plant, I asked them to accompany me to the electric light station, only a few squares distant, which they did. We examined, or, rather, looked at, several very powerful steam engines running large dynamos, and then went into the boiler house, where we found eight immense steam boilers, five of which were under a full head of steam. Pointing to the coal in the bunkers, I said: "Sandy, there is the source of your electric motive power. *All the energy is stored there and is transmitted through the boiler, engines, dynamos and wires to your establishment.*" Whether Sandy and his partner comprehended this or not, I cannot say, but from their indifference, I concluded the subject was either above them or below them, so I dropped it.

In one electric station in New York their boilers are rated at 2,600 h. p., and at one of the stations in London, Eng., over 6,000 h. p. may be seen. I admit that it is not absolutely necessary to use steam power to generate electricity, but its equivalent cannot be dispensed with. Thus it appears, fuel, or, in other words, energy, is at the bottom of it all, and those powerful dynamos are as harmless as drain tiles or paving bricks until you charge them with energy from physical or chemical sources.

It is steam power and water power that render electric lighting and electric motors a financial possibility.

Now let us resume our inquiries on the gaseous fuel question and next let us examine water-gas. Hydrogen, strictly speaking, is the only fuel gas in water, but the water-gas we have to deal with is a mixture of hydrogen with other gases, and the cheapest way to make it is by passing steam through a thick body of incandescent coke, or other carbonaceous fuel. The theory of this gas making is, that the white hot carbon decomposes the steam by appropriating to itself the oxygen of the steam, thus liberating the hydrogen. The carbon unites with

the oxygen in the proportion that forms carbonic oxide. Theoretically, steam decomposed in this way ought to resolve itself into equal volumes of carbonic oxide and hydrogen, 9 pounds of steam ought to make 1 pound of hydrogen and 14 pounds of carbonic oxide, or about 180 cubic feet of each; 25 pounds of steam would then make 1,000 cubic feet of the mixture. The heating power of this 1,000 feet of mixed gases would be 342,490 heat units, and would be equal to about 23½ pounds of good coal.

Now let us see what quantity of this perfect water-gas would be required to run your boilers, and as your boilers require about the same fuel daily as the brick kiln mentioned above, the calculations will apply to both. The ten net tons of coal then equal 20,000 pounds, and this divided by 23.5—the weight of coal that is equal to 1,000 feet of the water-gas—will give the quotient 851; this then is the number of thousands of cubic feet (851,000 cubic feet) of gas required each 24 hours.

We have seen above that it requires 25 pounds of steam to make 1,000 feet of gas. If then we multiply 851 by 25, we arrive at the weight of steam necessary to make the 851,000 cubic feet of gas and find it to be 21,275 pounds. I must request you to go carefully over these calculations and let me know of any errors you find. I have not checked them, so will thank you or any one else to do it.

If then, we require 21,275 pounds in 24 hours, we shall require 886.45 pounds in one hour. The most recognized standard for rating steam boilers is the evaporation of 30 pounds of water per hour for 1 h. p. So, if we divide 886.45 by 30 we get 29.5; this is the horsepower and determines the capacity of the boiler we need to generate steam for the above quantity of water-gas, we will then say a boiler of 30 h. p.

We will now see what amount of carbon is taken up by the decomposition of 21,275 pounds of steam. If we divide 21,275 by 9, we get the weight of hydrogen derived from this weight of steam, which is 2,364 pounds, leaving 18,911 pounds of oxygen. You are no doubt by this time well aware that for every 8 pounds of oxygen there must be 6 pounds of carbon to form carbonic oxide, or for every pound of oxygen there must be three-quarters of a pound of carbon; therefore, three-quarters of 18,911 pounds is 14,183 pounds; this then is the weight of carbon taken up by the steam, and

forms 33,094 pounds of carbonic oxide. Pay particular attention now, even if it is dry and obscure, exercise a little patience and it will all be plain and easy. We see then that the oxygen of the steam consumes 14,183 pounds of carbon; let us see next what amount of fuel it will require to generate the steam in a 30 h. p. boiler, just described, and putting the coal at 5 pounds per h. p. per hour, or a total of 150 pounds per hour, and in 24 hours 3,600 pounds; this added to the 14,183 pounds will make 17,783 pounds.

The decomposition of steam can only be effected with carbon at, and above, a certain temperature; the higher the temperature the quicker the decomposition takes place; therefore, it is essential that the fuel in the generators be kept at a high temperature; this can only be done by having two or more generators, so that while one is being cooled down by the steam, the other is being heated up again by a fan-blast; this means a further consumption of fuel which cannot possibly be less than what is required to give the hydrogen all its future energy and as we generate 2,364 pounds of it, we must call its equal in coal 9,900 pounds; this must then be added to the 17,783 pounds making 27,683 pounds or nearly 14 tons; this, then, is the theoretical amount of carbon that is absolutely necessary to furnish the same amount of heat as 10 tons of good coal, and, mind you, I have assumed that the decomposition and reactions are all perfect, and that no losses are sustained by clearing the generators of clinkers, or any other incidental occurrences that are always a source of loss.

In practice, however, no such perfection is realized, judging from the analyses I have been able to obtain so far, and bearing in mind that water-gas pure and simple when made by passing steam through a bed of incandescent carbon should be about equal volumes of hydrogen and carbonic oxide. The following analyses by no means conforms with the statement just made, about equal volumes, etc. The first two analyses below are given by the Fuel Gas and Electric Engineering Co., Pittsburgh, Pa., presumably of the gas they produce.

	No. 1.	No. 2.
Carbonic acid.....	4.60	3.00
Olefiant gas.....	.60	.80
Carbonic oxide...	26.20	28.60
Hydrogen.....	46.00	42.00
Marsh gas.....	7.40	6.80
Nitrogen.....	15.20	18.80
	100.00	100.00

The following are from Barr on "Combustion of Coal," a work I have recommended to you in one of my former letters. The first is an analysis of water-gas by the Strong process, and the second of "gas formed by the action of superheated steam on charcoal," as given by Bunsen.

	No. 1.	No. 2.
Oxygen.....	0.77	
Carbonic acid.....	2.05	14.65
Nitrogen.....	4.43	
Carbonic oxide...	35.88	29.15
Hydrogen.....	52.76	56.03
Marsh gas.....	4.11	.17
	100.00	100.00

The following are also Barr's work, and is the ideal water-gas from Pennsylvania anthracite, consisting according to Percy, of the following combustibles, etc., free from ash:

ANTHRACITE COAL.	
Carbon.....	94.63
Hydrogen.....	2.73
Oxygen.....	1.28
Nitrogen.....	1.36
	100.00

From 100 pounds of this anthracite we might expect in pounds:

Nitrogen.....	1.36 lbs.
Carbonic oxide.....	201.69 "
Hydrogen.....	14.25 "
Marsh gas.....	10.92 "
	228.22 "

Or reduced to percentages would be

	By weight.	By volume.
Nitrogen.....	0.60.....	0.32
Carbonic oxide.....	88.38.....	201.69 "
Hydrogen.....	6.24.....	47.25
Marsh gas.....	4.78.....	4.54
	100.00	100.00

In concluding this letter I feel conscious of boring you with what may appear dry and useless detail, having apparently no practical bearing, nor having the slightest connection with every day wants and appliances; I will, however, endeavor before finishing the water-gas question show you the practical side, therefore go carefully and slowly through this and wait patiently for my next.

Yours paternally,
HYDRO-CARBON.

If our readers will simply write the words "CLAY-WORKER" on the margin of their letters when writing to our advertisers for circulars, etc., they will confer a favor both on us and the advertiser. The latter is anxious to know the source of the inquiry and the words "CLAY-WORKER" will tell the whole story.

THE STRENGTH OF BRICK WORK.

AN OLD STACK at the Bessemer Steel Works, East Carondelet, Ill., was thrown recently, there being a little history connected with its fall, it occurs to me that perhaps you might care to notice it in the CLAY-WORKER. The third attempt was made before they finally succeeded in falling the stack; it was thrown by blasts of dynamite and powder. I was present at the second effort and also at the last; the stack was somewhat weakened on one side by several courses of brick being picked out; it was then charged, I think, with four blasts of powder, but they blew out without doing any damage, not having been drilled deep enough and plugged properly; at the second attempt there were five holes drilled, five inches in diameter and about five feet deep, and properly filled and rammed and did good work, but did not throw the stack. And it is right here the point comes in; one whole side of the stack was torn out by the blasts, and still the stack did not fall; the hole was large enough to drive a locomotive into, the stack being 25 feet in diameter at bottom and 20 feet in diameter at top, and 186 feet high. This, it seems to me, is a remarkable evidence and test of the strength of brick masonry work when the brick are properly selected and laid, so I took the measurements of the remaining portion of the base of the stack as it stood after the second attempt to throw it; also, had it photographed from several points of view. The remarkable feature to me was to see that huge shaft of brick work towering up towards the sky with almost the entire half of its base torn away. In fact, if you will deduct the two remaining openings that were built into different sides of the stack, it was standing upon much less than half its base. It impressed me with the strength and sufficiency of brick work as I was never impressed before.

ANTHONY ITTNER.

St. Louis, Mo.

Written for the Clay-Worker.

HINTS ON BRICKMAKING.

No. 54.

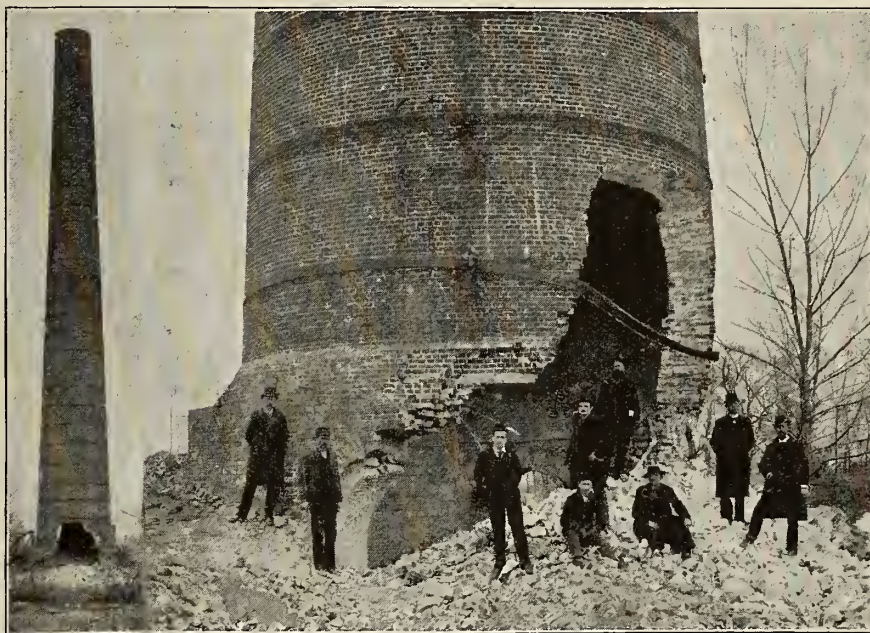
BY "R. BRICK."

THE question with brick manufacturers is no longer: "Shall I put in improved kilns?" Instead arises the query: "What improved process shall I adopt, as there are a number of good kilns on the market?" This depends entirely upon the use it is put to. For burning all repressed brick or all street paving brick and in quantities less than one hundred thousand, a down-draft kiln is probably the best to use, and for burning drain tile and light wares an up and down-draft is well adapted, as the ware can be dried with upward draft and finished

repressed, the product is just as valuable. At works where bricks are made in large quantities—from twenty-five thousand to one hundred thousand per day—it is necessary to burn the product in kilns holding from two hundred thousand to five hundred thousand bricks, unless a continuous kiln is used.

The great point claimed for continuous kilns is their economy of fuel. Theoretically, this is the "ideal" kiln; a certain amount of bricks burned and ready for market each day. The bricks are made to-day, dried by to-morrow and set in the kiln dry and hot and heat applied before they get cold, and within a week they are burned and delivered to the building. This is probably the coming kiln. The great "first cost" is the

principal objection offered to this kiln. The next seems to be the fact that the ashes among the bricks discolors them. This is a serious objection where they are to be used in buildings. There have been many failures with continuous kilns in this country. This, however, is not due to lack of merit in the principle, for there are many of these kilns in successful operation in Germany and other foreign countries. The trouble with our brickmakers up to this time has been



with a downward draft. The moisture is less liable to injure the ware. For burning common building brick or for burning repressed, ornamental or paving bricks where the quantity of common brick produced is equal to or greater than the former, up-draft kilns with furnaces attached are best.

First, they are the cheapest kilns to construct and operate. Second, in these kilns a larger quantity of bricks can be burned in a single kiln. They can be built to hold one hundred thousand or one million, the larger kiln being more easily managed than the smaller. Third, they are more durable as there is no arch to support and keep up, and where all common building bricks are burned, or where sixty per cent. are common building brick and the balance pavers or

they are not willing to invest money enough to make these kilns as they must be to be permanent and a practical success. They undertake to line them with common bricks or even, in some cases, unburned bricks. This will not answer for a permanent kiln of that kind and gives the kiln a poor chance to show its merits. I have known some of these kilns to be constructed in such a manner that some portions fell before the kilns were finished.

There is one important point to consider in selecting kilns. If a kiln costs too much to construct, it may wear out, or in other words, become useless before the saving it brings equals the first cost of the kiln. In this case the owner would lose money, however well and cheaply it burned his wares. After the brickmaker

has determined upon the kind of kiln he will put in, the next thing to do is to build it just right; have plans and specifications. Not only this, but the first kiln you put in, employ a man who is familiar with the process to superintend the building, setting and burning of it. This is cheapest and best and gives the kiln a chance to demonstrate its good qualities; not only this, put in good material. Get the best of fire bricks, for these are exposed to intense heat at each burning of the kiln, and common brick or a cheap grade of fire brick may prove, in the end, more expensive than good brick. After you have the kilns in operation you must superintend the management of them or employ some skilful and reliable man to do so for you. A cheap burner is even worse than a cheap built kiln, and allow fuel enough to him to burn them hard, and time enough to burn them uniformly and well. If a brickmaker sees a kiln of brick half burned does he stop to enquire the amount of fuel consumed, or how few were the days it required to spoil the bricks. It is a failure—nothing more, nothing less. When he sees a well burned kiln of bricks all, or nearly all, hard, uniform in color, bottom to top and from side to side; no broken, cracked and melted arch brick, does he care whether it took him five days or ten days to burn it. He looks and says it is well burned; it is a *success*, and I want a kiln just like it to burn my bricks in.

This is the great point—practical success—good results, bricks all saved and ready for market. This is the best kiln, even if the fuel costs \$1.00 per thousand bricks while the half burned kiln costs but twenty-five cents per thousand bricks to burn them.



FIRE PLACE AT UNITED STATES ENCAUSTIC TILE WORKS.

BURNING.

There was a time when I thought I could write something about the burning of brick and clays that would be of service to the craft; now, I am not so sure. After all, why do we write, and why does the CLAY-WORKER publish our writings? Is it that we may see ourselves in print, and does the CLAY-WORKER publish our articles to gratify our vanity? We trust that neither is the case.

I have noticed the columns of the CLAY-WORKER carefully, for some time, with the purpose of determining, if possible, the influence of its columns upon the craft as shown by the higher plane the articles of every number take over those of a preceding number, and I believe every fair minded person will admit that its contributors are being built as well as building on a higher plane. There is not to be found now the strife over small, trivial questions that there was formerly. Leading articles are now more general in their terms, suggestions and applications. The narrowness which formerly hedged about some of your contributions is now broadened. The opinions we once advanced with certainty we have now abandoned, or, if still held to, it is, with some degree of uncertainty.

This is none the less true with the many vexed questions of burning. Not long since we were all agreed that "a brick was not a brick until it was well burned." Even this proposition has been denied by a recent inventor who claims that good "bricks" can be made without burning.

My business, however, compels me to take issue with this last proposition, and assert in strong terms that "a brick is not a brick until it is well burned."

Many of our recent writers have laid down excellent rules for burning common, ordinary building brick, or such brick as many of the craft call merchantable, that is, one-third smooth hard, one-third rough hard, and one-third salmon and soft, but "rough hard," salmon and soft are not well burned brick, that is, if the rough ones get their roughness from the burning.

We are all agreed, I presume, that it is a much more difficult task to burn merchantable brick, such as described above with the usual appliances, namely, the common scoved and clamp kilns, than it is to burn a better grade of brick with better appliances.

I have noticed from time to time in your columns very exhaustive articles, descriptive of the best methods of setting and firing of common and scoved and clamp kilns, and no doubt many of your readers have followed these instructions, as they thought, to the letter and failed, while, no doubt, many others have improved their burning.

Why these failures? There are many reasons. One important one is that too often the instructions are not followed. The good advice may not at first be understood by the reader, or, if understood it may pass through several hands verbally before being practically applied, and thus lose much. *Though we have often been told we never learn.*

Many of our most prominent educators hold that telling is not teaching, neither is hearing learning. In order to know a thing it must be stamped upon our mind indelibly, and in order to do a thing properly we must first know how and be able, with sufficient training, to apply effectively, this knowledge. The burning of clays is not an exception.

There has been enough said in the various journals devoted to the clay industry during the past three years, to make good brick burners of us all, if we had read understandingly, and had put the knowledge thus acquired into actual practice. I grant, however, that there are many circumstances which might arise in various localities that have not yet been covered. But if we want to be experts in our profession we must reason from analogy, in other words, exercise our judgment and reasoning faculties.

"Few of us come into the world with silver spoons in our mouths," equally true is it that none of us come into the world natural brick burners, and I am afraid a much less number will acquire the art of burning than will acquire the silver spoon, after all.

WHAT IS BURNING?

I imagine that if your readers were each required to send a definition or answer to the above question without making any comparisons one with another that you would have definitions sufficient to make quite a volume. To illustrate: In some localities the term "burning" is applied to all the time covered from the instant the fire is lighted in the kiln until it is finished. In other localities the process of burning is not supposed to begin until the kiln is water-smoked. If this last definition is taken as correct, quite a number of places do

not burn their brick at all; for instance, at Chicago, when a kiln is watersmoked it is burned. That is, they burn their common brick under the watersmoke.

Aside from the above, I think the term "burning" is applied to the firing of brick or clay wares, with fuel of any kind, under all conditions or circumstances, and to any degree of hardness.

Good burning, however, is quite a different thing. When we speak of good burning, several additional and important elements enter into the definition. Good burning implies better and best burning, but not perfect. It also implies bad (ill) work and worst burning. If a report was asked from the brickmakers of the United States as to the quality of their burning, a very large majority would be on the side of good burning. The average of such reports would remind us very much of the school boy's conundrum—"If we call a calf's tail a leg, how many legs will it have?" "Answer quick." "Five." "Not so," replies the questioner, "calling a calf's tail a leg does not make it so."

I admit that the dividing line between good and bad burning brings the two so close together that it is often difficult to know exactly on which side one stands. But the average brick burner is sure to give the prisoner the benefit of the doubt, and call it good.

Again, what is good burning in one locality would be very bad in another, and vice versa. I have known prominent writers to describe the method and quality of burning in their own particular locality and pronounce it good. While the same method or quality in another locality and for another market would be condemned as bad.

We should not be content with that kind of good burning which comes so near the dividing line as to be doubtful. Let us strive for better if not the best burning. As said above, best burning does not mean perfect burning by any means; perfect means perfect and nothing short of it.

I am often asked if I can burn a kiln of brick uniform throughout. I answer no. But a kiln can be burned practically so, also a kiln can be burned practically perfect.

I have stated above that good burning included several elements. It depends largely upon the kind of wares that are to be burned. Good burning, as applied to common building brick might come far short of being good if applied to pressed or street paving brick. Again,

good burning for street pavers is not at all likely to be good when applied to pressed or ornamental brick. The material and kind of wares to be burned must be taken into account. Again, the brick may be burned good, whether common, pressed, or street pavers, and still the burning will not be good in a broad sense.

The time required and the labor and fuel used are very important elements when the question of whether the burning is good or bad is to be considered. A burner may give you good kilns of brick, yet if his methods are such as to destroy the profits the burning must be bad in one sense at least.

"But," says one, "why do you not tell us how to burn a good scoved or clamp kiln of building brick?" I wish I could, but I cannot, and I have yet to see the man that can. I do not mean to imply that I have not seen men who could burn such kilns well, not by any means, for I have seen many good burns in scoved and clamp kilns, but there is always more or less of an uncertainty about it. The best burners often make mistakes in the best kilns, much more are they liable to do so with a scoved kiln.

I have often heard the declaration from brickmakers in certain localities that they could get quite as much for a kiln one-third salmon, one-third rough and one-third smooth hard, as they could if all the brick were burned hard and smooth. This may be true in some instances, but certainly it is not often the case.

Improve your burning and your neighbor must do likewise or sell out and go East, not West, because the Western brickmaker burns better, usually, than the Easterner.

I would advise all who really desire to gain knowledge on the subject to look over the old files of the CLAY-WORKER, if they have been fortunate enough to preserve them, and I am quite sure you will add much more to your store of information. Again, if you feel in need of knowledge do not hesitate to give us an accurate report of what you are now doing, remembering that by exercising our faculties we often gain much to ourselves.

W. A. EUDALY.

Each one of us is bound to make the little circle in which he live better and happier; each of us is bound to see that out of that small circle the widest good may flow; each of us may have fixed in

his mind the thought that out of a single household may flow influences that shall stimulate the whole commonwealth and the whole civilized world.—Dean Stanley.

BRICKMAKING IN BAGDAD.

The British Consul General at Bagdad in his latest report has some interesting observations on brickmaking in that town. All Bagdad, with a population of about one hundred and sixteen thousand souls, may be said to be built of kiln-dried bricks. Stone is little used there, as it is in Mosul, in house building and although the tenacious clay of Irah gives good material, its use is confined chiefly to huts and agricultural squattings along the Tigris banks. There is thus an enormous demand for bricks. These are all hand-made and kiln-dried. There are about twenty-five large and small kilns at work, in the hands chiefly of Jews and Christians. But the turn-out is far behind the demand. Half-built houses sometimes remain so for long periods for want of bricks. The kilns are dotted over the desert outside the city. Often in Spring, when the Tigris or Euphrates lays acres of ground under water, these stand like islands in the inundation and brickmaking is suspended. The usual prices of bricks at the kiln side is £1 16s. per 1,000 of twelve inches square, and 18s. per 1,000 of seven inches square. The bricks are carried from the kiln on small donkeys each taking not more than ten large or twenty-five small bricks. In the course of transit they get much broken, as the best, though good to look at and of a chrome yellow color, are very brittle. Another great promoter of the demand for bricks is the absorption of water every winter, bricks suffering equally with the mortar in which they are laid, owing to their porousness. Thus there is hardly a house or wall or brick pathway in Bagdad which does not constantly call for patching or rebuilding with new bricks. The old city walls, thrown down about 1870 by Midhat Pasha when Governor General, remain still, in spite of years of burrowing and abstraction, a mine of broken bricks. Under a late regime it was said that the right of taking these away and selling them was conferred as a substitute for pay on the soldiery, but at present all classes seem to help themselves to them. These remarks serve to show what a good opening there is in Bagdad for brickmaking after some simple but scientific method.—*The London Times*.

THE TIFFANY IRON WORKS,

Tecumseh, Mich.

Tecumseh is a beautiful village of 2,500 inhabitants, in what has been reported in the U. S. Census to be the richest agricultural county in the United States, Lenawee Co., Mich.

The manufacture of Drain Tile Machines, of the Tiffany patents, was commenced in this village in 1860. There are now five factories in the county, exclusively for the manufacture of brick and tile machines. The Tiffany Iron Works lie in the southeast angle of the crossing of the Cincinnati, Jackson & Mackinaw and Lake Shore & M. S. R. R.

warming the building, for which the arrangement is very effective and economical, but for keeping the heater and boiler clean. The well water is heavily charged with lime which would soon coat the flues. A very large proportion of the water used is the water of condensation. The building is made comfortably warm, and power developed to run an automatic engine of from 50 to 75 H. P. with about 1,100 pounds of coal per day. The south end of the building for 75 feet is devoted to the foundry. This is provided with a Whirlwind Cupola and Champion Blower, by means of which iron is melted in 35 minutes from the lighting of the fire. A platform 14

building. The first stone was laid August 18th, and pattern making was commenced the 23rd day of October.

This company asks for patronage on account of the experience in clayworking and machine building of managers, of the fact that its patterns are of new and excellent design, and that no poor material will be used in constructing their machines.

SELF DEFENSE NOT "CRITICISM."

First, however, thanking "R. Brick" for considering our's of January worthy of his consideration.

Our practical experience is confined



A siding passing through the works in close proximity to coal and coke sheds and cupola gives excellent facilities for receiving coal, coke and iron and for shipping machinery. The main building is 50 ft. by 196 ft., of brick and covered with slate. Large double windows, fourteen feet from center to center and well balanced, give an abundance of light and air. The work benches are so arranged that the vices are directly opposite the double windows. The building is heated by the exhaust steam from the engine, passing through about 4,000 feet of 1½ inch pipe, arranged in parallel lines, suspended just below the tie beams to the roof. All the water of condensation is returned to the heater and pumped back into the boiler. This is a great advantage, not only as regards

feet wide extends across the north end of the foundry, provided with emery wheels for the purpose of cleaning castings. Large sliding doors open into the machine shop, a room 50x126, which is provided with excellent machinery for the work. A blacksmith's shop 24x34, and a store room for paints, varnishes and oils lie in the rear of the building. They are, also, of brick covered with slate. Another main feature in the main building is the construction of the floor. Floor timbers were laid, and clayey earth and gravel were tamped in between and under them, so that the oak floor planks lie on solid ground. All the machines are on brick foundations laid in cement. The filling in of solid earth beneath the floor and the brick walls and slate roof make it almost a fire-proof

to the burning of drain tile, but we think the mass of burners will "agree with us" that different kinds of ware made from similar clay differ but little in the mode of burning. But, again, down goes our "man of straw," because we do not believe that, though all men agree with, or against, us, that it in any way changes facts.

Galileo taught that the world "did move," and was imprisoned for his pains. Harvey discovered the circulation of the blood, and Jenner was the first to advocate vaccination; the medical world agreed against them. Fulton invented the steamboat, and was considered crazy. But come within range of our own recollection. The idea of a man riding a vehicle with two wheels in a straight line was laughed at; the idea of talking

to a person at an indefinite, almost unlimited distance was considered equally impossible.

The world "did move;" the blood did circulate; vaccination is generally practiced, yea, legally enforced. The steamboat, the bicycle and telephone are now well known and highly appreciated. Our improved method of burning clays in any shape or kind of ware will be more highly appreciated when more thoroughly investigated and better understood.

STEWART BROS.

Mt. Victory, Ohio.

CORRESPONDENCE.

THESE COLUMNS ARE OPEN TO ALL. THE FULL NAME AND ADDRESS IS REQUIRED BUT WILL NOT BE PUBLISHED EXCEPT WHEN PERMISSION IS GIVEN BY CORRESPONDENT. THOSE DESIRING TO COMMUNICATE PRIVATELY WITH ANY CORRESPONDENT WHOSE FULL NAME IS NOT GIVEN CAN DO SO BY ADDRESSING LETTERS CARE OF CLAY-WORKER.

Use and Waste of Fuel.

Editor Clay-Worker:

Mr. Waplington fires off a copy book maxim at me with an effect which would be crushing did I not remember that "some guns" when aimed at duck or plover bear wide and kick their owner over.

Certainly, having gone from wood to coal, from coal to oil and from oil back to coal, it would seem as if I were in search of facts rather than opinions. As for maxims, you doubtless remember the brief correspondence between the mother and her son:

"Dear Son, come home; a rolling stone gathers no moss."

"Dear Mother, I won't; a setting hen never grows fat."

I had sense enough some thirty-five years ago, to be an enthusiastic believer in the Bessemer process for making steel from pig iron and have been ready to accept the Siemens regenerative process, so far as I could understand it from a superficial reading and I am ready to take and adopt any amount of gaseous theories if I can save 75, 50 or even 25 per cent., over our present method of burning with coal in portable furnaces.

Mr. Waplington says of his method: "It is a state whereby perfect combustion and consequently the development of all the heat in the fuel becomes practical and easy."

Mr. Davis says we are wasting 75 per cent. of our fuel, and Mr. Waplington, by inference, says 40 or 50 per cent. If Mr. Davis is right, then instead of burning 8,447 brick with one ton of coal as we do, we ought to burn 33,788 brick

with the same fuel. If Mr. Waplington is right, we should burn 16,892 brick with the same amount of coal.

Mr. Waplington, if I understand him, puts his fuel into a domed cupola, and by the combustion of a part of it, develops gas for burning brick that puts coal away in the background. Now by what economy or transposition of energy is this done? What chemical change that gives this great advantage over coal burned in grates at the mouth of each arch? How can he get four times as much heat out of a ton of coal as we can?

All the products of combustion, except a few ashes, pass up through our brick, and if he is right, there must be a large volume of unburned gas escaping at the top. If it does, it passes through a mass of brick which are almost at a white heat.

Perhaps it may be thought that our clays burn easier than most red clays. As data to go by, I will say that a cord of mixed chestnut and oak, or maple or beech, will burn 4,000 brick. We found wood to cost twice as much as coal at \$4.20 per ton; oil as much as coal at \$1.00 per bbl. of 40 gallons. We now burn bituminous coal and use no other fuel in the whole process. We use portable grates 18 inches wide and 56 inches long; a fire chamber composed of U shaped fire brick, with perforated sliding doors and all covered with the sand used for sanding molds; so little heat escapes from the sand that we can bear our hand on it at any time. We set 23,000 brick to each furnace arch.

My dearly beloved friend D. V. Purington (may he live long and come to convention every time), used when burning with coal a few years ago, six feet of grate surface at the mouth of each arch to burn some 40,000 brick per arch, while we use seven (7) feet of grate surface, each furnace to burn 23,000 brick which gives me good reason to think our clays require more heat than his. Taking the Hudson River brick as a standard, our clays require more heat than theirs.

You cannot get more heat from coal than there is in it. We burn our coal with nothing left but a few ashes, and I doubt if there is much, if any, escape of gas or carbon in our furnace gas generators. It takes from six to seven days to burn a kiln and when done and cool, we can take away the furnaces, take down the walling as we need it for another kiln, and the kiln of burned brick with

no soft brick in it, is ready to be loaded from all parts without working through doorways or round corners. With an \$800 plant we could burn 5,000,000 brick in a season of seven months. This is what we can do with our present light on the subject. When Mr. Waplington gets through with us, we may know better and do differently. While I am ready to accept "Thus saith the Lord," I kick when it comes to "Thus sayeth Tom, Dick or Harry," with no other authority behind them than their own *ipse dixit*.

S. P. CRAFTS.

A Tale of Woe.

Editor Clay Worker:

The careful captain always looks out to see if there any signs of heavy weather. I looked over the columns of your last issue to see if our Western and Southern brickmakers were enjoying favorable weather. The good ship, "Brick," which has to make New York City her port, is meeting with "waves" of such proportions that the oldest captains are appalled at the prospect. Our captains do not mind how large the waves rush at seven dollars or more per M., as there is no danger of swamping, but when the little cross seas of five dollars or less per M. comes in, and the vessel is freighted with a cargo that is worth at port of destination six dollars, he looks at every little cloud to see if he is likely to meet any worse weather than he has for the past three years. The captains' faces wear an anxious look this spring; the seas are very ugly and larger clouds appear. Less permits out for new buildings, and a general strike on the 1st of May. At least 130,000,000 of last year's stock to go on the market and it is time to commence to make new, and if our Western brothers have any sympathy for the distressed, he can let some of it go out to his Eastern friends. Only think of it, April, and good, hard Hackensack brick selling on the New York market at \$5 per M., at a time of year that, usually, \$7 is the price. \$5 will not pay for the cost of making, without adding any sum for rent or wastage and reduction on "pale brick." Last April good brick were bringing \$7 per M. In June the price was as low as \$4.50 in some cases, and the prices at the close of navigation was \$5.75. The year 1891 will, in all probability, be the "Red Letter" year for the manufacturers in this section, as regards low prices, unless some concerted action is taken by them in the output of brick.

Some of our Hackensack yards are just getting ready to mold, others are loading their vessels for the first time this season; they have been holding them in stock in hopes that there would be an improvement in price.

From time to time in the CLAY WORKER I see our Western friends are some on figures. I would be pleased if some of them would work out the following problem: How long will it take our brickmakers to become millionaires when they pay the following prices:

Foreman, \$4 per day; second, \$3 per day; setters and pit shovelers, \$2.25; molders and sanders, \$2; wheelers and cart men, \$1.75; engineer, \$3; coal for engine to make 42,000 per day, about \$2; coal dust 15 cents per M.; \$1 per M. for burning; \$1.25 freight, 12½ cents commission; feed for four horses, wear and tear on material; royalty on clay and sand, 75 cents per M., which is low, as in Haverstraw the royalty is from \$1 to \$1.25 per M. Then sell his brick for \$5 per M. for best hard; pale, \$2.25 per M., of which he will make 10 per cent. of his whole production.

What will the harvest be? May the good ship safely sail into a seven-dollar harbor in the near future, or you will be besieged by the captains with "ads." for "situations" on the Western waters.

A. N. OLTIMER.

Hackensack, N. J.

Philadelphia News Items.

Editor Clay-Worker:

From indications at present on the surface, there will be no further trouble among the brickmakers. Just now they have fresh in their minds the fact there is 100,000,000 of all grades of brick in the various yards ready for use, 50,000,000 of which are said to be press brick; but as regards this, there are different opinions. At all events, there is quite enough brick on hand to make manufacturers independent of employes. The hands who struck are perfectly willing to return to work on old terms, but many of the yards have concluded not to run full handed at present. The manufacturers, as a rule, have made no money, and may have been so eager to do business that they have disposed of their stocks without profit, while still others have made contracts and failed to deliver the brick, finding, in the end, that they would be losers. This seems to be a queer way of doing business, but it is said to be the fact, and greed is at the bottom of it.

The Jardin Brick Company have built two new patent kilns of the Gregg make; one has just been put in position, and for the other they have the foundation about ready.

George W. Sharer has been quite busy for some time building improved dryers and Calorific kilns. He has just finished a dryer for "stiff mud" of 50,000 a day capacity for the Ivy City Brick Company, Washington, D. C., a new concern just organized; also one of 30,000 a day capacity "soft mud" for the same party, and another of 60,000 a day capacity for the Georgetown, D. C., Brick Company, another new Co. just establishing them-



TWO BOSS BRICKMAKERS.

selves in the business. They have also increased the plant of John W. Brem, Dayton, Ohio, by putting up a 25,000 capacity "soft mud" dryer. This is an old company and they are increasing their working capacity in many ways.

The Richmond Brick Company, of Claymont, Delaware, who have an office in the Girard Building, this city, have offered their yard with a large number of brick, together with machinery, for sale. They have an extensive river front to their property and are desirous of disposing of their land for manufacturing purposes. This was the idea which induced them to start a brickyard at that point. They operate a Penfield outfit which, they claim, has given universal satisfaction in every respect. The brick machinery, patent ovens and everything about the yard is first-class and very suitable for the manufacture of superior brick. They have the facilities for shipping either by water or by rail, and are intermediate between Philadelphia and Wilmington, Delaware.

A sample of potters clay has been received by the Moorhead Co. of this city, from Frackville, Schuylkill County. The

quantity sent was very small, however, but after testing it was found to be a superior article for making enameled brick, and may also be used for other purposes to advantage. The deposit of clay is said to be quite large. There will be a factory erected at that point by the owner of the property, Mr. Hamptz, who is said to be very wealthy. The Moorhead Pottery Company have not commenced operations this spring owing to complications arising in the settlement of the estate.

The discovery of a large deposit of potters clay at Frackville has led the Crescent Tile Company, of Washington, to enquire with a view of developing the find.

A new species of pottery has been invented at the Sevres Manufactory. This new pottery is said to stand the effect of rain and frost. It will be in request for the decoration of parks and gardens.

If no complications arise between the bricklayers, carpenters or others who are the essentials in building operations, this will be a brisk season for brickmakers. Among the large buildings already contracted for is a large theatre, hotel and many first-class dwellings. It is not known what the new Reading Elevated Road will be built of, but it is pretty well settled that the depot at Twelfth and Market Streets will be of brick.

In brick machinery, business is dull, with the possible exception of two or three



"KALI'S" OFFICE.

makers who are quite busy. So many small yards have put in machinery within the past two years that it has created overproduction, consequently many are cutting one another's throats in a business way.

John J. McDuffee, who makes press

brick a specialty is using the Chambers Machine for one grade of brick and the Carnell Repress; he manufactures a large quantity of brick, used principally in his extensive building operations, and for evenness and good quality of the machines in general, he has the highest praise to offer.

Samuel P. Miller, manufacturer of red and fire brick presses, has been very ill



A PHILADELPHIA CLAY CONVEYOR.

the past week with something on the order of the "grip" now so prevalent in this city. He is still confined to his bed.

A QUAKER.

From the Rockies.

Editor Clay-Worker:

Enclosed find postal order for \$3.50 subscription for CLAY-WORKER, with many thanks. The amount of excellent reading matter catered to the peruser of the CLAY-WORKER, whether he be interested in manipulating clay in any of its various forms or not, is well worth the small amount charged.

I am sorry I was unable to attend the last meeting of the National Brick Manufacturers' Association, as I am well aware I missed what cannot be recalled. It reminds me of lost days on a brickyard, they never can be replaced, and there is no money made on a brickyard, only on the days we are making bricks. So with missing the annual meeting—those who were absent can console themselves by reading the reports of the business transacted, but I have attended too many of the meetings to be idiot enough to imagine that I can get the same satisfaction from perusing the pages of the CLAY-WORKER as I would have got had I been there in person; also being deprived of the great pleasure of a whole-souled, hearty shake of the hand from so many of the craft who was there, as I

know from experience that every "shake" starts the blood on a new flow and keeps it in circulation to such an extent that I almost now imagine I can hear the heart beats of Brothers McAvoy, Adams, Morrison, Craft, Purington, Eudaly, Blair, Gates, Ittner, and the other no less noted members, but too numerous to mention in this short sketch. I think one grand suggestion was promulgated at your Convention, viz., that hereafter the manufacturers of machinery shall be privileged to exhibit their machinery and explain to the craft its usefulness. As every year machinery is becoming more in use it is but right that the members should have some way of being enlightened in reference to the machine that would be best adapted to their clay and locality. There will scarcely be a machine exhibited, but that some member present has it in use; he can explain the nature of his clay, the manner in which he prepares it for the machine he uses, etc., etc., thereby imparting such information that is impossible to get through a correspondence. Also, dryers. I have put in a steam dryer, and I have spent thousands of dollars experimenting with it; I have written to almost every person in the United States that is using the same kind of a dryer for information, but, so far, I am still in the "soup." Now, if at the Convention several members should be there who have the same kind of a dryer, also using the same kind of a machine (stiff clay), I could inquire about the nature of their clay, how they regulate their steam pipes, their draughts, and different questions that are too numerous to write, and, even if asked through a correspondence, they are generally answered in such a manner that to test them is almost an impossibility. Now, Brother Randall, encourage the exhibition of all kinds of machinery used in the manufacturing of bricks, so that at our next Convention, (which, by the way, I hope will be held in Washington, D. C.) the members who have not yet put in machinery and those who may have had the misfortune to have machinery not suitable to their material, may come away from the Convention fully satisfied that they have learned more in regards to the success of their business in a few days than they have learned in all the past since they commenced on the progressive road to fame and fortune by using machinery in the manufacturing of bricks. There is a rule to run all kinds of business and there must be a rule to guide all kinds

of brick machines, brick dryers, brick kilns, etc., so that any and all kinds of clay can be manufactured into bricks successfully. It is with sincere regrets that I convey to Mr. Morrison and Mr. Gates the sorrow I feel, that old chums like they don't get enough bricks at home without going to Indianapolis to get their hats full. But, as far as I can learn, it was only "bats" they got at the Convention, and, poor fellows, they don't have any of them in their cities.

Before closing my few remarks I must tell you something in regards to our local organization in Denver.

A HIGH OLD TIME.

Never since Old Noah embarked in his life boat has there been such a winter as we have experienced in this city. We have had four months of continual snow frost and rain.

There is in stock on the different yards about thirty millions of bricks carried from last year's products, and if the weather don't improve that will be a sufficient supply for this season. No one has thought of starting their works up to the present time.

Our local association, having nothing to do to drive cold sorrow away, concluded they would desert the brickyards for at least one evening and shake off the "blues." Having come to this conclusion they authorized our worthy Treasurer, I. A. Keefe, to get up an entertainment regardless of expense, even if it bankrupt the entire craft in our locality, with the determination to have one good jolly night together, consequently our Treasurer purchased fifty tickets for our members to attend the Tabor Grand Opera House on the evening of the 14th, and witness the performance of "Blue Beard." Each member was presented with a badge before leaving the Hall, and we marched to the Opera with the step of veterans, who had conquered all foes and were now in search of new conquests. How I wish some of our old "cronies," such as Flood, Siner, Merwin, Ives, Pike, Fletcher, Raymond, Brush, etc., etc., had been there to witness the broad smiles, and the hidden blushes by our old members here when the *tights* appeared on the stage. Well, you can imagine the effect when you take into consideration the morality of each and all of us. After the conclusion of the play (we stayed to see the last of it, you bet) we adjourned to the *Arcade* Hotel, where a banquet was served in a style fit for *Clay Kings*—as we all imagined ourselves to be—to which we did

ample justice. Then came, as you call it at the National Brick Manufacturers' Convention, the "Powwow." Exercises were opened by Mr. J. Eplic, on "Brick Burning." (I am sorry to inform your readers none of us were able to open them with prayer). "Brickmaking by Machinery," by Mr. F. N. Davis. "Relations of Brick Contractors to Brick-making," by Geo. Cottrell. "Necessity for Better Brick," by J. Gregory. "Dry Press Brickmaking," by John Boyle. "Manufacture of Paving Brick in Denver," by Mr. Lamar. "Which is the Better Process, Machinery or Hand?" by Mr. Kavanaugh. "Clay In and About Denver," by Mr. Chambers, of Beatrice, Neb. "Artificial Drying," by your humble correspondent, which subject I could handle in but a crude manner—"My kingdom for a Purington at that moment." Several other speeches were made, but as I am getting this uninteresting letter rather tedious I will refrain from boring your readers by prolonging it. But I must add that all our members were highly pleased with the manner in which we were entertained, and we owe a debt of gratitude to the proprietor of the Arcade, Mr. Murry, who entered into the spirit of brickmaking with a will and did everything that was possible on his part to make our evening pleasant and enjoyable. At 3 a. m. we closed by singing the "Star Spangled Banner," and, hoping that our Treasurer might soon muster us in the same manner again.

I hope the next Convention will be well attended, and, if the Lord is willing, and "Machines and Dryers," don't lay me out bare-footed by that time, I shall be there.

J. MCCAIN.

Enameling Brick.

Editor Clay-Worker:

In continuation of the subject of enameled brick making, I propose the question, "What is a glaze?" and will try to give an answer. A glaze is a chemical compound of materials (the proportions of which are well known) in certain quantities to produce a given result. This definition is true of all glazes. Manufacturers of the higher branches of earthenware early sought to discover these materials and to ascertain their properties and to mix them in such a manner as would suit the body on which it was to be put and to obtain a definite result. But this has not been the ease with coarse earthen ware manufacturers; I know some places in this country where they are using the same

glaze that was used when my grandfather was a boy (and that was a fairish bit ago). This glaze is made up of only two things, viz., lead and clay, in the proportions of 50 pounds of lead to 22 pounds of thin clay slip, and I have no doubt but this is the glaze used originally in your country for coarse pottery and for brick, as indicated to me in an extract from *The Brickmaker*, as given by "An Old Timer" in your April issue of last year. This glaze will expand when exposed to alternations of wet and frost and in time will fall off, giving the impression to the inexperienced person that the brick had run away from the enamel, which is an impossibility. Now all the material used in earthenware glazes are well known to glaze brick makers, and many that are not so used, for they have searched creation through and through to discover something that would answer universally, and used things likely and unlikely with this result, that as far as making really high class ware we are not much in advance of what we were thirty years ago. Now, some of your readers may be asking what is the reason of this state of things?

I will state some of the reasons, and first we say that the infinite variety in the nature and composition is one cause of failure. A statement by one of your correspondents will bear me out in what I have to say on this point. He says they have two clays, differing widely in their nature and composition, divided almost by a straight line, and this is the case in this country. Every country is known to produce clay having its distinctive feature in composition and color and every field of clay differing in some minute particular. This distinction in surface clays is still more definitely marked in what may be termed fire clay, which is met at varying depths below the surface. We will name a few of them and their characteristics. Take the Yorkshire clay, or the Leeds clay as standing first in the order of quality for this purpose; this is a light buff clay, plastic when ground, will vitrify at a fairly high temperature and has a medium shrinkage—about five-eighths of an inch to the foot. Here you have the highest development of quality for enameled brick making (but these conditions are not absolutely necessary). Take next the Staffordshire clays; on the borders of Worcestershire and Staffordshire is found the world-famed Stowbridge clay. There are three clays of great value all in one seam here.

Two of these are hand-picked from the mass. When brought to the surface the best is used for glass pots and bricks and blocks for glass furnaces and when sold as ground clay is worth 50 s. per ton. The second is a black clay, and is used where less heat is required. The bulk is called the offal. This is the clay from which the world famed fire brick is made. This clay is not vitreous at any heat and therefore porous; shrinkage about one inch to the foot—contains a large amount of iron. These conditions are dead against the manufacture of enameled brick (but are not absolutely prohibitory). Many of the manufacturers have tried it and given it up in despair, but there are three places making in the aggregate about 40,000 per week. The clays in South Wales differ very much from either of those named. This clay will vitrify at a low temperature. Some of it is quite granular, it is not plastic even when ground very fine; shrinkage about three-quarters of an inch to the foot and contains a large amount of iron. I think I need not go further on this track. What I wish your readers to see, and what I think they will see, is that one glaze and enamel and one set of operations would not suit for all three of these places. A glaze suitable for the Welch clay put on the Staffordshire clay would not flux before the brick were half burned, and a glaze suitable for Leeds clay put on Welch clay would not flux before the bricks were melted into one lump, and I have seen a kiln of bricks run down into one mass from this cause. Then the enamel generally used is fine ware, potters clay or shavings; you will see if the enamel and the brick have the same shrinkage, then all may be well, but if the brick runs in more than the enamel it would fall off; if the enamel runs in more than the brick, it will crack cross-ways of the brick. I have taken these three places to show that what can be done at one place is no criterion as to what can be done at another, although you may have the same man at both places, and there is no man this side the water or on your side that can make enameled brick the first time he tries at any place, no matter what his knowledge may be; but knowledge and skill will remove a great deal of the difficulty, and there is no necessity for any firm to go on month after month making goods that are neither fit for use nor ornament. If a man does not make good bricks, of a good commercial value, out of his

third kiln there is not much hope of success. I wish to say in closing this paper, don't be covetous, don't think that because your neighbor is making them, that if you could get their man by paying him half a dollar per day more than he is getting he will do the same for you. The probability is you will live to have little more wisdom, a lot less money, and to wish your neighbor had him back again. The vital points to be considered and the basis of success are nature and composition of the clay, which must be a fire clay, the temperature it would stand to bring it up to a condition that it will absorb the moisture and the amount of shrinkage. The glaze should have no lead in it, under any circumstances, and the enamel should be made to shrink with the brick and vitrify at the same temperature. There are other causes of failure which are included in color, dipping, burning, and kilns which will be dealt with in my next paper. **MANAGER.**

Melting Points of Metals and Alloys.

Hydro-Carbon,

Care of Clay-Worker:

DEAR SIR:—Is there not something wrong about the "melting points" furnished at the bottom of the second column of 214th page of February issue of CLAY-WORKER, in your most interesting and valuable letters to "Dear Will." For example: "A mixture of 3 of tin and 8 of bismuth, also melts at 212°," "1 tin and 1 bismuth at about 285°," while "tin about 440°," and "bismuth 500°."

I thought at first "A New Compo" might have done it, and waited the receipt of following number of CLAY-WORKER before writing; but the fact that the melting points rise in regular rotation, would seem to agree against this view of the matter.

I trust you will excuse the liberty I have taken in drawing your attention to a thing, about which I may, after all, be quite "at sea," and that you will be able to find time to write me a personal letter, however short, if only to let me know who is the writer of letters, from the perusal of which I derive so much pleasure and profit. **R. M. GREER.**

HYDRO-CARBON EXPLAINS.

Editor Clay Worker:

The above letter from Mr. Greer is, I think, of more than mere personal interest, and it may serve the purpose of more of the CLAY-WORKER's readers if

you will allow me to reply through your columns.

The melting points of metals vary with their physical condition and chemical composition; hence, Rankine gives for cast iron 3,479° Fahr., while Pouillet gives for "very fusible" cast iron 2,010° Fahr. and 2,190° Fahr. for second melting. Again, Rankine gives for bismuth 493° Fahr. and Pouillet 518° Fahr., etc. Iron and steel are much influenced in their melting points by the percentage of carbon they contain, the higher the carbon the lower the melting point; other impurities in very small quantities have, also, a marked influence on the fusibility of iron and steel; pure iron is nearly infusible. If then, 2 per cent. of carbon will reduce the melting point of iron 1,000° or more, we need not be much surprised at an alloy of bismuth and tin having its melting point 200° to 300° below that of either of its components.

I apprehend the difficulty with Mr. Greer arises from the impression that 3 of tin and 8 of bismuth would not melt at 212° if put side by side in a melting pot or ladle, and in this he is right.

I ought to have said "alloys" instead of "mixtures" of these metals, and I thank him very kindly for calling my attention to it. I see, also, that there ought to be 3 of lead added to the 3 of and 8 of bismuth. These alloys ought to be made by melting each metal in a separate pot and mixing well when melted, which may be done by pouring back and forth in the ladles a few times.

What I have said about iron is, also, applicable to platinum and many other metals. Generally speaking, the purer they are the higher their melting points, hence, the difference in authorities. If every brick manufacturer could furnish us with the melting point of his clay, what a range of temperatures we would have, and analysis of all the clays would, doubtless, show us the purest were the most infusible.

Metals in a state of chemical purity, and under the same physical conditions have doubtless invariable melting points.

Finally, I may illustrate the lowering of the melting points of metals by alloying, in a similar manner by making a brick of so many parts clay and the balance lime mortar, the clay by itself is highly refractory, and the lime by itself infusible, but we all know that such a brick would not stand the heat of an ordinary kiln firing.

Yours truly,

HYDRO-CARBON.

Brick Upon Brick.

Editor Clay-Worker:

The following poem, by G. H. Barnes, appeared in the old *Scribner's Magazine* a few years ago, and as some of our craft are bricklayers, as well as brick manufacturers, I thought it would be interesting to them, at least the bricklayer is the best patron of the brick manufacturer and both are builders.

B. W. BLAIR.

THE BRICKLAYERS.

"Ho! to the top of the towering wall!"
'Tis the master-mason's rallying call;
'To the scaffolding, boys, now merrily climb;
'Tis seven o'clock by the tow bell's chime.
Bring to your work good muscle and brawn,
And a keen, quick eye where the line is drawn:
Ont with your low tempered blades of steel,
Smoother than glass from point to heel;
Now, steady and clear, from turret and port,
Ring out your challenge, 'Mort', oh, 'Mort'!
'Clink! Cluk! trowel and brick!
Music with labor and art combine;
Brick upon brick, lay them up quick;
But lay to the line, boys, lay to the line!"

Cheery as crickets all the day long,
Lightenig labor with laugh and song,
Busy as bees upon angle and pier,
Piling the red blocks tier upon tier,
Climbing and climbing still nearer the sun,
Prouder than kings of the work they have done,
Upward and upward the bricklayers go,
Till men are but children and pygmies below;
While the master's order falls ringing and short,
To the staggering carrier, "Mort", oh, 'Mort'!
'Clink! Clink! trowel and brick!
Music with labor and art combine;
Brick upon brick, lay them up quick;
But lay to the line, boys, lay to the line."

Who are the peers of the best in the land,—
Worthy 'neath arches of honor to stand?
They of the brick-reddened, mortar stained palms,
With shoulders of giants and sinewy arms,
Builders of cities, and builders of homes,
Propping the sky up with spires and domes;
Writing thereon with their trowel and lime
Legends of toil for the eyes of Time,
So that the ages may read, as they run,
All that their magical might has done.
So "Clink! Cluk! trowel and brick!"
Work by the master's word and sign,—
'Brick upon brick, lay them up quick;
But lay to the line, boys, lay to the line."

Clay Mortar.

Editor Clay-Worker:

Enclosed you will find my subscription to the CLAY-WORKER and, also, the price of Mr. Cray's book "Brickmaking and Burning." I want to keep a file of the CLAY-WORKER as long as I am engaged in the brick business. It is good enough for any one to read, even if not in the trade. The new ideas and growing interests in brickmaking are worthy the attention of every progressive man. The CLAY-WORKER not only gives us the best ideas in the manufacture, but also many facts in lines in connection with the use of brick.

There is one idea of which there has

been considerable said, that is—in what manner can buildings be made nearer fire-proof? That question can be easily solved in brick buildings by the use of common clay for mortar on the inside courses; use lime mortar for the outside course, clay for all others. It is a little more work to lay the brick, but when done is practically fire-proof.

We have been using a permanent kiln some six or seven years laid with clay mortar which is as sound and solid as when first built, except small scales on the inside. Now if a mortar will stand the heat necessary to melt clay, kept up for a week or ten days, why will it not stand the heat of a few hours in a burning building? The burning of lime mortar destroys all the adhesive properties of lime so that it is little better than sand. On one occasion I saw a chimney that had stood until the building had been consumed, thrown like a wet rag by a boy throwing a piece of brick at it.

Wishing you a prosperous year, I am

EDWARD BROWN.

In and About Toledo, Ohio.

Editor Clay-Worker:

Not having seen anything relating to the brickmaking industry of Toledo in the columns of your admirable journal, I am led to ask you, sir, whether you know that such a place as Toledo is in existence? It is strange that Toledo is not represented in your columns, for its brickyards are numerous and the annual output well up in the millions. Two new companies have been organized and will commence operations very soon. These are the Collingwood Brick Co., located on Collingwood Avenue, and the Buckeye Brick Co., located on Woodville Street, on the east side. Both companies are backed by ample capital and will push the business for all that is in it. Both are fitting up in fine style and have put in engines from the Atlas Engine Works, at Indianapolis, Ind. The Buckeye Co. have put in a Penfield Machine and expect to be in operation in a day or two.

The Findlay Hydraulic Press Brick Co. have been compelled to remove their extensive works to a new location as the supply of clay was completely exhausted. The new location is about $1\frac{1}{2}$ miles further down the river and is near the Malleable Iron Works. Here a fine location has been secured. The bank when fully developed, will have a face of not less than fifteen feet. The machines

used by this Co. are the old reliable Henry Martin. The output of this yard last season was nearly 8,000,000. Mr. James Fox is the efficient foreman of the institution. He is the right man in the right place.

One more yard on the East Side claims our attention; it is the Howell Yard located on the D. & M., near the Smith Bridge Works. This is the oldest yard on the East Side and was started up many years ago by the late Jos. F. Owen; it is a small yard but makes a most excellent quality of brick. Natural gas is used as fuel.

On the West Side, many old established yards are to be found—Hall, Boice, Arnold, Fox, Spear & Jacobs and others too numerous to mention.

The City maintains a brick plant. It is operated by the prisoners at the Work House or, as it is better known, the Stone Yard. It is a good paying institution (the brickyard, remember).

The outlook for the coming summer is most excellent. Building and various improvements requiring brick will boom, for which the brick manufacturers are very happy. But enough! Farewell!

PLYMOUTH.

From the Great Northwest.

Editor Clay-Worker:

News regarding brickmaking here is best kept quiet. I estimate the loss to some brickmakers and would-be brickmakers, at \$300,000 as the result of establishing yards with costly machinery and getting ready when the rush was over.

Concerning ourselves, I may say, that we were ready in time, and, therefore, do not complain at the rather dull time and modest dividend, it is all one can expect. The time when dividends were counted by the 100 per cent. is gone, and now one finds time to think of our friends and devote more time to other than mere mercenary pursuits.

I have something for you to publish bye and bye, but for the present I will still remain a little selfish.

Generally speaking, however, you may say, that our Company, though not a very big concern, (we only sold last year not quite \$100,000 worth of brick) is one of the most prosperous ones, and that the choice of the right machinery which we bought from the Frey-Sheckler Co., has a great deal to do with our success. In one of our yards we use wood for fuel, and after a while, perhaps, I may

tell you how I managed to make one-quarter cord of wood do the same work as five-eighths to three-quarters of a cord.

ROBERT NIEDERGESAESS.

Seattle, Wash.

Good Intentions.

Editor Clay Worker:

I have just received the April number of the CLAY WORKER, which pleases me very much. I have been manufacturing brick by hand for the past three years, and expected to put in machinery this spring, but gave it up on account of poor health.

A. L. HATCH.

Central City, Ia.

An Old Brickmaker's Views.

Editor Clay Worker:

I have been making and burning brick for the last ten years, all over the country. Have made and burned brick out of almost every kind of clay and on all kind of machines. I have seen more yards make a failure from the want of proper management than anything else. I have used all kinds of kilns, and have the first kiln to loose. I find the most important thing in the first place is to prepare your clay right before you make brick, and then you will not have any trouble in making a good brick. I have seen few yards, either mud or dry press, that prepare the clay right before it goes to machine, and of course they can't expect to get a good brick. On a mud machine the clay ought to be pulverized well and then tempered, and I will guarantee most any machine that they have will turn out good brick, and when their brick are thoroughly dried they will find they have a much less per cent. of broken brick than they did before. All brick should be thoroughly dried before going in the kiln. I find the largest per cent. of broken brick is caused by drying them, and after your brick are thoroughly dried, if there should by any of them cracked, throw them out and put nothing but good brick in your kiln, and after they are burned you will find but few broken brick in the kiln, if any, so I say it will more than pay any company to put up a dryer to dry their brick before they go into the kiln, for they will save time and and money, and as for dry press brick, there is where almost every yard has made a failure, for by drying their brick before they put them in their kiln they can stop the expense of all the broken brick by putting them back and grinding them up again. For if they

set them in the kiln direct from the machine it takes them six or seven days to watersmoke them, and there is where their brick is broken—while drying—and then there is the expense for fuel to burn them and they are not any account after they were burned, so you will lose your time and fuel when you could have burned all good brick at the same cost, and saved a yard full of bats.

The machine for the brickmaker to adopt is the one that will produce the best possible brick from his clay with the smallest amount of water to remove; his brick require time and fuel in proportion to the amount of water

WILLIAM'S TRIPLE-ROLL CLAY CRUSHER.

The accompanying cut represents an invaluable machine for brickmakers. They are built in three sizes: No. 1 has rolls 24 inches long. No. 2 has rolls 30 inches long. No. 3 has rolls 36 inches long.

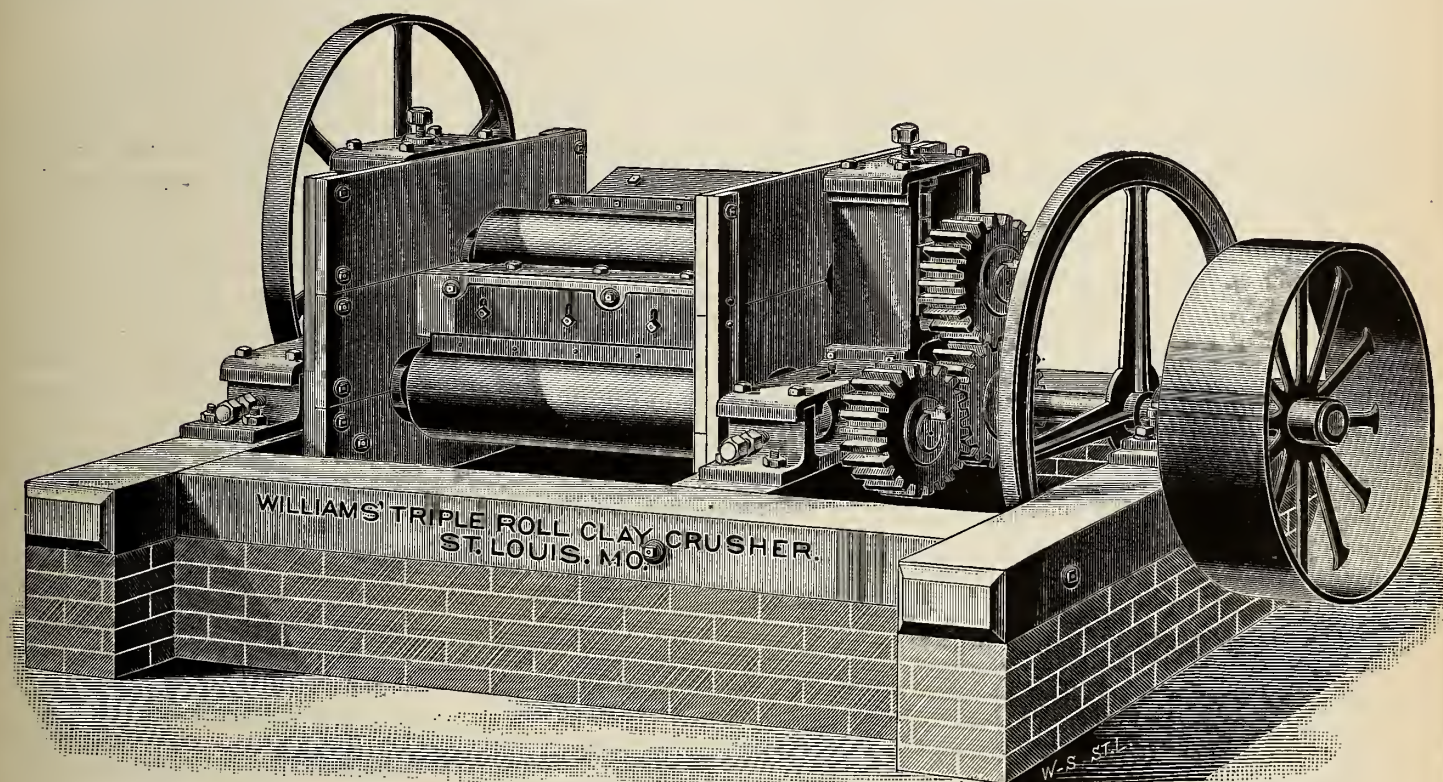
The main roll is 15 inches in diameter; the top and side rolls are 9 inches in diameter. The gear-wheels are all the same diameter, thus securing a differential speed. The top rolls are fed by an automatic star feeder, which is also a clod-breaker. *It cannot be choked under any circumstances.*

these rolls are best adapted—the very tough and refractory clays are most suitable.

These machines are made by M. F. Williams & Co., 2705 N. Broadway Street, St. Louis, Mo., who will be pleased to give any additional information desired.

A NEW SCHEME.

A company is being formed, it is claimed, to establish a large plant on a portion of the Iron Works property at Charlotte, N. Y., for the manufacture of paving brick by utilizing the slag from the furnace. It is proposed to erect a



evaporated. Consequently no more water should be used than necessary to make the best possible bond of clay. In the manufacture of dry press brick the amount of moisture is comparatively small, consequently less time and fuel is required to dry them. Many manufacturers set their dry press brick in the kiln without drying them. This, however, is not a correct principle, as it requires a long time and careful watching and firing to watersmoke them, whereas it would only require a small dryer to remove the few ounces of water in a dry press brick, and the burning would then be done in as short a time as other properly dried brick.

C. M. LIGHTER.

These rolls discharge to the bottom rolls, which gives the clay a second crushing—they, of course, being set closer together than the top rolls.

A wagon load of clay can be dumped into the hopper at one time, without detriment to the proper working of the machine. Each roll is supplied with a strong rubber spring which will let hard substances pass through without any harm.

The rolls are made of the best chilled iron, ground true, and can be set to any degree of fineness. They are built very strong, have large journals and long bearings, which are self-oiling. Also with reversible boxes for taking up wear.

There are certain clays for which

cupola to melt the slag, and in accordance with a chemical process, mold the mixture with the most durable and suitable bricks for paving purposes. These bricks can be molded into any desired size or form. The company has, it is reported, secured a large paving contract in Toronto and other large Canadian towns, and the product will be mostly shipped by lake from the Iron Works' docks. It is estimated that the company will melt from ten to fifteen tons of slag per day at the start. There is now in stock at the furnace a sufficient quantity of slag to last two or three months, or until the furnace goes in blast again, when the capacity can be increased to about twenty-five tons daily.

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81 Massachusetts Ave. Indianapolis.

A CRUCIAL TEST.

It is quite generally conceded by those who have given the subject the least bit of attention that brick pavements are superior for driveways where the travel is not heavy, but there is some doubt about their withstanding the heavy traffic to which main thoroughfares of large cities are subjected. The opponents of brick pavements are quite willing to admit that it is a very good pavement for side streets or country towns, where there is little travel and that of a light character, but profess to believe that it won't stand heavy traffic. This argument is the main dependence of the granite and asphalt advocates and when once positively refuted deprives the opponents of brick pavements of their only effective weapon. We are therefore not a little interested in a test now being made in Chicago, which we think will fully determine the durability of brick pavements under heavy traffic. The Western Stone Company have paved the driveways in their southside yard with brick from the kilns of the Purington Paving Brick Co., of Galesburg, Ill. The pavement is laid in the usual manner on sand foundation, one course of brick on the flat and one on edge. We doubt if any bit of pavement is subjected to heavier traffic than this. The Western Stone Company employ thirty odd teams in hauling stone from this yard, every load of which passes over this pavement. The average weight of each load is over four tons. The pavement has been down a month

or more, and, so far, there are no signs of wear at all. There is little doubt but that it will stand unimpaired for years to come, thus disproving the claims of those interested in other paving materials that brick will not stand under heavy traffic.

AGE AND INFLUENCE.

Everything that is good, valuable and vigorous has to grow, and this, perhaps, is truer of news and trades papers than of anything else. Advertisers are often satisfied with the sworn statement of the paper that evidences so many thousands daily, weekly or monthly, without considering the value of this circulation. The growth of a paper means its growth into the sentiments and affections of its readers, and confidence is a plant of slow growth. It is easy for a newspaper to issue as many thousands as its capital will stand, but after the thousands are distributed it is as impossible to enlist the sympathy or attention of the reader, as it is to compel a horse to drink. Every man has his preferred newspaper—the one he swears by—or if he is of very independent cast of mind, the one that unconsciously sways his views and opinions. He is swayed for the same reason that his best friend sways him—because through long acquaintance he has learned his sterling qualities, his sound judgment and unswerving honesty. It is the same faith that must come for a magazine before it may influence the minds of its readers—a faith and confidence begot only of a long-time and thorough acquaintance.

THE COMING ROOF.

The Clay Shingle Co. have resumed operation at their works and are turning out a fine grade of roofing tile. The first carload made this season was shipped to Mr. F. N. Trevor, of Lockport, N. Y., who is erecting a fine residence there. Mr. Trevor has thoroughly investigated tile roofing both in this country and Europe and is positive in the conviction that the tile made by the Clay Shingle Co. of this city is superior in many respects to that of foreign manufacture. It was his intention to import French tile for his roof but on examining the clay shingle found it to be lighter and better as well as less expensive and so will use it in preference to any other. It is not a question of economy, however, with Mr. Trevor, who is building an expensive residence, but a question of

the best roof. The most durable, the cleanest and handsomest. "There is nothing that answers these requirements so fully as the clay shingle," says Mr. Trevor, and his opinion is especially valuable, for he has traveled through Europe and given particular attention to the subject of roofing. He brought home with him some French tile that he had decided to use but after seeing the clay shingle changed his mind, being convinced that they are much better as well as cheaper. In his opinion the clay shingle is the coming roof, and we believe the idea will grow as the roof becomes known. It is undoubtedly the most durable, and we think the handsomest and most sensible roof for permanent structures.

ONE OF THE ESSENTIALS.

In an interview with a representative of the *Bangor (Me.) Commercial*, an old time brickmaker of that place said that, in his opinion, there is no business pursuit that calls more imperatively for a system than does the ancient and honorable calling of a brickmaker—a calling whose antiquity is beyond question, and of whose honor and respectability there is no need of defense. System bears the same relation to brickmaking that a rudder does to a ship, and is as necessary. System is everything. The old saying that "Money makes the mare go" is true. We can not, in these days of "spot cash," conduct a business without its aid. We must have some honest bona fide capital besides "cheek," and the more of the two combined the better in order to make a success of brickmaking. Capital without force or energy to drive things along is well nigh useless. Experience, with its many costly lessons, aids your understanding.

NATIONAL REAL ESTATE INVESTORS' GUIDE.

Another bark has set sail on the broad sea of commerce, and if we may judge from appearances it will have a safe and profitable voyage. Vol. 1, No. 1 bears unmistakable evidences of ability and enterprise of high order. A master hand is at the helm evidently, and as the field is wide and rich the future of the Guide is most promising. The first (May) issue contains a great deal of very interesting matter pertaining to the real estate interests, and if this standard of excellence is maintained it will soon have very a large following. We welcome the Guide and wish it the success its mer-

its deserve. For specimen copy, address National Real Estate Investors' Guide, Union Square, New York City.

TRADE LITERATURE.

We are indebted to the Tile Fire-Proof Construction Co., New York City, for a handsome pamphlet containing illustrations of buildings, or portions of structures, constructed by them. It is claimed by many that there is no such thing as a fire-proof building. In the strict sense of the term this may be true, but if a building is properly constructed according to the improved plans and of the material furnished by this company, it will certainly be *very near*, if not absolutely, fire-proof.

CHAMBERS BROS. CO., PHILADELPHIA, are out with a new catalogue of stiff clay machinery that is something more than a mere collection of illustrations and descriptions of their machinery, though it is replete with both. The illustrations, and many of them are of unusual size, are well executed and give an excellent idea of the stiff clay system as operated by the Chambers method. Those of our readers who are not familiar with this process, will find much in this catalogue that will interest them. A copy will be forwarded to any of our readers on application.

THE IRON CLAD DRYER CO., CHICAGO, Ill., have ready for delivery a new catalogue, fully describing their steam heat and natural draft system of drying brick and tile, and will be pleased to send a copy to any one desiring information on that all-important subject. This company have had a wide experience in handling the different varieties of clays throughout the United States, and have so perfected their system that they are able to dry successfully almost any kind of clay ware. They also offer the trade a variety of iron cars, for which important advantages are claimed.

EVENS & HOWARD, ST. LOUIS, Mo., are sending out a neat little pamphlet giving sizes and prices of the sewer pipe and fire brick which they make in almost all known shapes and in unlimited quantities. Their fire clay works are among the largest in this country, and their ware has a world-wide reputation. Their products during 1890 aggregated over 60,000 tons, and were shipped to various points in South America, Cuba, West Indies, Central America, Mexico, Africa and China.

THE SANDERS ENGRAVING Co., St. Louis, Mo., have ready for delivery a handsome catalogue of their different process engravings, and will gladly send a copy to any of our readers who want anything in their line. They are making some fine half-tone plates, though they are not confined to that character of work, but are prepared to make engravings of all kinds at reasonable prices.

THE SOUTHERN EXPOSITION.

We are in receipt of circulars announcing the holding of a great exposition and Inter-State Mechanical Fair, at Raleigh, N. C., during October and November, 1891.

Northern manufacturers are especially invited to take part in the display. The managers promise that every possible effort will be made to advance the interests of exhibitors, and, it is thought, that the exposition will be one of the most extensive and successful ever held in the South. Any of our readers desiring information with a view of taking part in the exhibition will please address Jno. T. Patrick, Sec'y, Raleigh, N. C.

A NEW STOCK BRICK MACHINE.

We present on page 572 a cut of a new stock brick machine. The inventor, Mr. Wm. Hilton, is an old-time brick-maker and has a practical knowledge of the requisites of a good machine, as well as the inventive ability to design and produce a mechanical appliance. He has been operating the machine on his brick yard with decided success, and now offers it to the trade, confident that it has few, if any, equals for steady, reliable work. Mr. Hilton will be glad to correspond with any of our readers who may wish to know more about this new machine.

HEAVY LOSS BY FIRE.

It is said that \$70,000 will not cover the destruction by fire at James E. Dingee's brick works, Twenty-second and York streets. In addition to the valuable labor-saving machinery which was mutilated, 125,000 brick were destroyed. The fire is the third which has occurred at the brick yard within two weeks. The first two were discovered in time to prevent any great damage.

Mr. Dingee has had considerable trouble with his employes about wages. About six weeks ago nearly all of his men, numbering about four hundred, went out on a strike. A compromise

was effected, and about one hundred and twenty-five men were taken back to work. Each of these fires had its origin near the labor-saving machinery.

When the fire was discovered yesterday morning the engineer was in the boiler room, and when he first saw the fire the entire dryhouse was in flames. He said that he could not see how it could be possible for the dry house to catch on fire. There was absolutely no fire within thirty feet of it. The bricks in it are dried by steam, and the steam-pipes are so protected that fire could not be communicated from them.—*Philadelphia Star*.

GIVE THE BOYS A CHANCE.

We call the attention of our readers to the "ad." of the new Standard Flower Pot Machine on page 530. This is a practical and successful machine, requiring very little power, and is so simple and easily operated that any ordinary boy can operate it successfully.

Many of our readers are so situated that they can easily add this machine to their plant and so give the boys an opportunity to make a few extra dollars and occupy profitably time that would otherwise, in all probability, be wasted.

IMPORTED BRICK REJECTED

James H. McGill of Washington, recently imported 650,000 enameled bricks for use in the construction of the new Congressional Library building. Some of them have been rejected as imperfect, and the contractor has sought to have them admitted to entry at the rate of \$1.25 per ton under the McKinley law. The Department, however, insisted on the 45 per cent. duty on the ground that, though defective, they are still enameled bricks. They are not good enough for the Government to use, (says the Washington Journal) but they are good for it to collect a duty enough upon.

The brickmakers of Denver, Col., are on a strike. They have so far succeeded in preventing non-union men from taking their places, and are violent in their antagonism to "scabs."

Those of our readers using sand for molds or for sanding stiff clay-brick will find the Standard Sand Grinder (cut of which appears on page 545) a decided advantage. It prepares the sand for immediate use direct from the Grinder without sieving. It pulverizes soft burned brick, thus producing a good substitute for sand where the latter is scarce or of a poor quality.

SPRINGTIME.

Dear Tom, the time is now at hand when folks are
bankering
To take their flannels off and don the lighter garb
of spring,
But don't you crowd the season, Tom, it isn't best,
for ah!
How many take them off too soon, and skip the
tra-la-la.

Then stick to your flannels, Tom,
With a purpose warm and true,
Stick to your flannels, Tom,
Until they stick to you.

For the victim isn't spared to stay among us very
long

Who takes his flannels off when first he hears the
robin's song.

Alas! how many folks there are who climb the
golden stair

Because they doff their flannels while a chill is in
the air,

And had they kept their flannels on, how many
who are dead

Might still be with us hustling like the mischief
after bread.

Then stick to your flannels, Tom,
With a purpose warm and true;
Stick to your flannels, Tom,
Until they stick to you,

For spring's a coy young maiden, Tom, and very
full of doubt,

And the undertaker 'll get you if you don't watch
out.

—Chicago Herald.

EDITORIAL NOTES and CLIPPINGS.

Runge, Texas, is to have a brickyard.

Bath, Me., is to have a new brick plant.

Crawford & Smith will make brick at
Perry, Ill.

D. Esty will start a brickyard near
Abbott, Me.

F. M. Searcy will make brick at Ft.
Deposit, Ala.

Capt. Wm. Henry will make brick at
Versailles, Ky.

Jno. Neeb will make brick near Con-
nellsville, Pa.

T. K. Kerr is to start brick works near
Riverside, Va.

A brickyard is to be established at
Hamlin, Kan.

Emmettsburgh, Ia., is to have a brick
and tile factory.

Minor & Co. are to build brick works
at Montezuma, Ga.

An extensive brick plant is being
built at Winslow, N. J.

Carlisle & Co. will start a new brick
factory at Opelika, Ala.

Dyer's Brick Works, at Greenfield,
Mass., is being enlarged.

The Eagle Lake (Ill.) Brick and Tile
Co. has been incorporated.

Warfield & Hepnu are to establish a
brickyard at Sykesville, Md.

Sevier & Palmer, Bristol, Tenn., intend
to enlarge their brick works.

The Baton Rouge (La.) Brick Co. will
put in additional machinery.

The Savage Mountain Brick Co. has
been chartered at Alexandria, Va.

The Kissel Fire Brick Co., of Roches-
ter, N. H., is putting up a steam dryer.

L. T. and T. E. Klingensmith will erect
a machine brick plant at Avonmore, Pa.

Miller & Norton are enlarging their
brick and tile factory at Farmington, O.

E. A. Dudley and James Horn will
start a brick yard near Jonesborough,
Ala.

Walker & Sons' brick works at Wind-
sor, Ont., were burned the 6th inst. Loss
\$20,000.

The Boone (Ia.) Paving Brick and Tile
Co. expects to be able to resume opera-
tions soon.

The Jacksonville (Fla.) Brick & Com-
mercial Co. has been incorporated with
\$50,000 capital.

C. P. Harrison and W. H. Baker, of
Winchester, Va., intend building brick
works at Salem.

E. S. Hacher & Son, Brunswick, Me.,
are going to largely increase the capacity
of their brick plant.

Robins Bros., Akron, O., are about to
build an extensive vitrified pipe works
near Johnsonsburgh.

J. M. Hanlin has built a brickyard at
Verbena, Ala., and will probably enlarge
it in the near future.

The Ocmulgee Brick Co., Americus,
Ga., will put up an artificial dryer, so as
to run the year round.

C. H. Brown and others, of Boston,
Mass., contemplate establishing brick
works near Luling, Tex.

A company of Boston gentlemen have
purchased a clay pit near Davenport,
and will erect a pottery.

The Kirkham Art and Decorative Tile
Co. has been incorporated and will erect
large works at Barborton, O.

The Aiken (S. C.) Fire and Ornamental
Brick Co. has been incorporated by J. E.
Anness and J. J. Livingood.

The brickmakers in and about Colum-
bus, O., are on a strike for an increase of
25 cents per day all around.

G. S. Facc, Norfolk, Va., writes that he
would like to receive prices on wood
pallets for use in brick dryer.

The Whittaker Pressed Brick Co.,
Quincy, Ill., has increased its capital
stock from \$20,000 to \$30,000.

M. H. Gibson, of Ryegate, has purchased
a brickyard at Paddock, Vt., and will
operate same the coming season.

The brick works of Harlow & Agnew,
New Alexandria, Va., were burned recent-
ly. Loss \$50,000. Insurance \$15,000.

The Star Brick Co., Buffalo, N. Y., have
put in two additional brick machines,
increasing their capacity to 80,000 a day.

Jesse H. Farwell, of Detroit, Mich., is
testing Wayne County clay, and, if satis-
factory, a paving brick plant will be
established.

The Coaldale (Ala.) Brick & Tile Co.
has increased its capital stock from
\$50,000 to \$100,000, and will enlarge
their plant.

A large deposit of good clay has been
located near Allentown, Pa., and a com-
pany is being organized to establish
brick works there.

The Cerrillos Fire Clay & Brick Co.,
Chicago, has been incorporated by R. A.
Brett, T. E. Baker and Grant Newell.
Capital stock \$100,000.

Francis A. Ostrander, of Troy, N. Y.,
and others, have organized a fire brick
company and will erect a large plant
near New Brunswick, N. J.

It is reported that a great deposit of
clay has been discovered near Little
Falls, Wash., and will be worked by the
Washington Fire Clay Co., of Tacoma.

The difficulty over wages between the
Trenton (N. J.) brick manufacturers and
their employes has been adjusted, and
no further trouble is anticipated there
this year.

The Buffalo (N. Y.) brick market is
very active. There is a greater demand
for brick than the local manufacturers
can supply and the outlook is very prom-
ising for a profitable season.

The Excelsior Brick Co., Castleton,
Ind., has been incorporated by M. M.
Reynolds, N. J. and W. Bush, of that
place. They will erect a plant with a
daily capacity of 25,000 brick.

The Burlington (Iowa) Vitrified Brick
Co. has adopted crude oil as fuel, and is
much pleased with it, though it is some-
what more expensive than coal. They
are now making 30,000 brick a day,
mostly pavers, from a rock mined near
the works.

Jonathan Creager's Sons, of Cincinnati, O., are erecting a complete brickyard equipment for Nicol Lamb, St. Louis, Mo.

The Jeffrey Mfg. Co., of Columbus, O., manufacturers of Chain Belting, Elevating and Conveying Machinery, are still enjoying a good trade, and are busy in all of their different departments.

The St. Joe Brick Co. has been organized by A. Rosenfield, A. O. Pessori, Wm. Garig and H. A. Frederick. A large plant will be erected at St. Joe Station, on the Northeastern Railroad, near New Orleans.

The Denver craftsmen, in addition to the dull times and generally unsatisfactory condition of their market, as related by Brother McCain in another column, are now threatened with a strike by their employes.

"When My Ship Comes Over the Sea," the latest musical hit. Price seventy-five cents. Special price, for introduction, post-paid, forty cents. Address Will L. Thompson & Co., 259 Wabash Ave., Chicago.

T. H. D. May, Esq., Montpelier House, Bath, Eng., wants a pair of rollers to take stones out of plastic clay; the rollers to fix on the top of pug mill, the stones to be taken out previous to the clay dropping into the pug mill.

Good, practical, reliable workmen are always in demand. Those competent to superintend and manage brick works can readily obtain desirable situations by making proper announcement in our "Wanted" column.

Many manufacturers are now arranging for various improvements in their works for the coming season. The putting in of new machinery of larger capacity will leave them with small machines and appliances that are to all intents and purposes as good as new, which may be easily disposed of by a small "ad." in our "For Sale, Wanted, Etc., column.

Wm. Fisher, of Pittsburgh, Pa., manufacturers of Grinding Pans, Pug Mills, Brick Presses, Engines, Etc., Etc., reports a very satisfactory trade. They are running up to their full capacity and yet find difficulty in filling the orders for their various machinery. They make a specialty of Grinding Pans, cuts of which are shown on page 566.

The Canton (O.) Brick Co., write that they have just completed improvements that will nearly double their capacity, by placing one of the Frey-Sheckler

Giant Brick Machines, Board Delivery Table, Pug Mill and Iron Frame Dry Pan in their works, besides a 150 h. p. Buckeye Engine, and can now make from 40,000 to 60,000 brick per day.

Jonathan Creager's Sons, of Cincinnati, Ohio, report the following recent sales: One complete plant for Bessemer (Va.) Brick Co.; same for S. J. Kane at Milton, W. Va.; same to Standard Brick Co., at Staunton, Va.; Machines to Schlingman Bros., St. Louis, Mo., M. Harriland, Columbus, O., Wm. Odenhoener, Jackson, Mo., McCan & Co., Huntington, W. Va., Frank Humann, St. Louis, Mo., Carrollton (Ky.) Brick Co., and to E. B. Russell, Danville, Ky.,—second machine.

The Cincinnati Corrugating Co., long and prominently known as manufacturers of high grades of corrugated and other forms of iron and steel sheets for roofing purposes, last year added a galvanizing plant complete, and it is a source of gratification to know that they have succeeded in establishing for their galvanized sheets a reputation for the same degree of excellence attained for their corrugated and other roofing plates. They are centrally located for shipping either North, South, East or West. Their stock is large and varied and they are at the front for promptness and excellence in executing orders. Their "Piqua" brand of galvanized sheets is rapidly coming into favor among those whose trade demands a superior article.

Milton F. Williams & Co., St. Louis, Missouri, write that they have closed a contract with Cote Brilliant Press Brick Co. for one 40-inch Williams' Disintegrator, Revolving Screen and Automatic Feeder Elevators, Brick Trucks, Pulleys and Shafting; have also sold one 40-inch Cyclone Disintegrator to Missoula, Montana; one 36-inch Cyclone Disintegrator to Kokomo, Ind.; Brick Trucks to Quincy, Ill.; Revolving Screen and Automatic Feeder to Milwaukee, Wis.—the third outfit to same parties; one Revolving Screen and Automatic Whipper to E. Chase & Sons, Milwaukee, Wis.—the second Screen to this firm; 40-inch Disintegrator to Excelsior Brick Co., St. Louis; a complete outfit to Seattle, Wash.,—the second outfit to this city, besides several smaller orders; 36-inch Pulverizer to Syracuse, N. Y.; Pulverizer to Smithville, Tex.; Pulverizer to St. Charles Mo.

**EVERY
BODY
SAYS
SO.**

Every body knows that what John Cubbins, of Memphis, Tenn., says is true, "Your Automatic Power Press is very satisfactory, is doing good work and making fine brick." Cubbins to Raymond April 23, '91.

James A. Furr, of Steam Corner, Ind., is in the market for a mascot. He recently purchased a new tile mill which was shipped to Veedersburgh, from which point it had to be hauled to the factory on a wagon. When about midway on this journey the wagon was upset and the huge mill, weighing several thousand pounds, toppled into the gutter. With the poor conveniences at hand the job of reloading was a difficult one, but it was finally accomplished and the mill set in place at the factory, when to Mr. Furr's consternation it was discovered that it was a right hand instead of a left hand mill. The latter is necessary owing to the position of the engine, so that the mill will have to be returned to the factory and another sent in its place. Words cannot express Mr. Furr's feelings.

We recently saw three new steam engines—two of perhaps one hundred or more horsepower and the other somewhat smaller—standing outside a building in which they were probably to be eventually used. These engines, had, to all appearances, been standing where they were, entirely unprotected from the weather for a month or two at least, for all the machined parts in view were covered with thick rust. Probably when they are put in place this rust will be scoured off with emery cloth, some of the emery working into the bearings and together with some oxide of iron, causing trouble at starting up. Then the builder will get blessed, and perhaps be compelled to send a man some hundreds of miles to determine why his engines don't run cool.—*American Machinist.*

YOU CAN'T COMPETE WITH THE U. S. MINT

in making money, but the man who presses bricks at 25 cents per thousand and sells them at several dollars advance by so doing, is coining money. Raymond's Automatic Power Press coins money as well as presses brick.

*Sixty seconds make a minute,
Sixty minutes make an hour,
One minute makes 13 fine pressed brick,
One hour makes 1,080,
Ten hours makes 10,800.*

Raymond's Automatic Power Press.

Useful and Ornamental.

We are all made of clay; alack!
Too solemn 'tis for mockery:
And some are useless bric-a-brac
And some are common crockery.

—*Washington Post.*

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Keeping Up With the Times.

The FREY-SHECKLER Co., Bucyrus, Ohio, are enjoying an enormous trade in their large variety of Clay Machinery; nearly three times as large in January and February as during the same months in any preceding year.

The most notable increase is in Dry Pans, Pug Mills and Auger Machines suitable for making Street Pavers.

It is now fully established by numerous trials that first-class pavers can only be made by an Auger Machine. It is also an interesting fact, that over 60 per cent. of all pavers made in the United States are produced by the Frey-Sheckler Co's. Auger Machine.

It puts more clay in a cubic inch than any other method.

It works clay at just the proper temper to make a uniform, homogeneous brick.

All parts liable to break are made of steel. It makes as many brick in a day as can be taken care of. It has with it, as an essential accessory, the Neidergesaess patent lubricating die, which makes smooth surface, square corners, saves power and lamination.

Another new creation that is finding favor with Brick-makers is the new patent cutting table. It is adapted to either side or end cut brick and its capacity fully 20 per cent. above any hand table heretofore used. The column of clay keeps constantly moving, is cut into side or end cut brick whilst in motion, and leaves no fragment to be thrown back into the brick machine.

It is too strong to break and constitutes an important complement to their excellent sets of brick machinery.

The substitution of a short, polished plate with a lubricating roller at each end, for the six or eight rollers that usually carry the column of clay from the die to the cutting table, is also a popular improvement by which the handling and frequent cleaning of the sticky rollers is avoided.

The two rollers really bear none of the burden of the column of clay, but only roll gently on its under side, spreading over its surface a thin coat of crude lubricant which they carry from the oil reservoir in which they run.

The company has several new and improved machines which they will introduce to the fraternity during the summer.

Their clayworking experimental station which they have erected during the past year at Bucyrus, Ohio, at a cost of over \$50,000.00 enables them to thoroughly test their new inventions before sending them to their customers' brickyards.

The interesting 29th Annual Catalogue of the Frey-Sheckler Co., Bucyrus, Ohio, will be sent free upon application.

See ad. on page 569.

THE CLAYWORKER.

VOL. XV.

INDIANAPOLIS, IND., JUNE 15, 1891.

No. 6

Written for the Clay-Worker.

EXAMPLES OF AMERICAN BRICK AND TERRA COTTA WORK.

No. 38.

A TERRA COTTA MANTEL.

THE accompanying engraving gives a very fair idea of the magnificent mantel and fireplace at the "Elms," Excelsior Springs, Mo. It is one of the most elaborate terra cotta mantels of which we have any knowledge. The work is very ornamental and well executed. We were unable to learn the name of the manufacturers, who certainly deserve much credit for the perfection and character of the work, which is very artistic, and presents a decided contrast to the cold, monotonous white marble mantel, so common a few years ago.

Terra cotta has a tone of its own. It has none of the garishness of painted surfaces nor the reflecting or glaring qualities of marble and stone, which destroys subdued lights that produce harmony, without violent contrasts in light and shadow.

Viewing this as a work of art we can but wonder that such mantels are so uncommon.

CLAY FLOORS.

THE Zulu woman is the architect and builder of the Zulu house, and the style of architecture is known in the colonies as "wattle and daub."

It looks like an exaggerated beehive,

for the Zulu mind has this peculiarity, that it cannot grasp the idea of anything that is not round or elliptical in form. There are no squares in nature. To build her house, the woman traces a circle on the ground fourteen feet in diameter, and getting a number of long, limber branches, she sticks them firmly into the ground and then bends the tops over

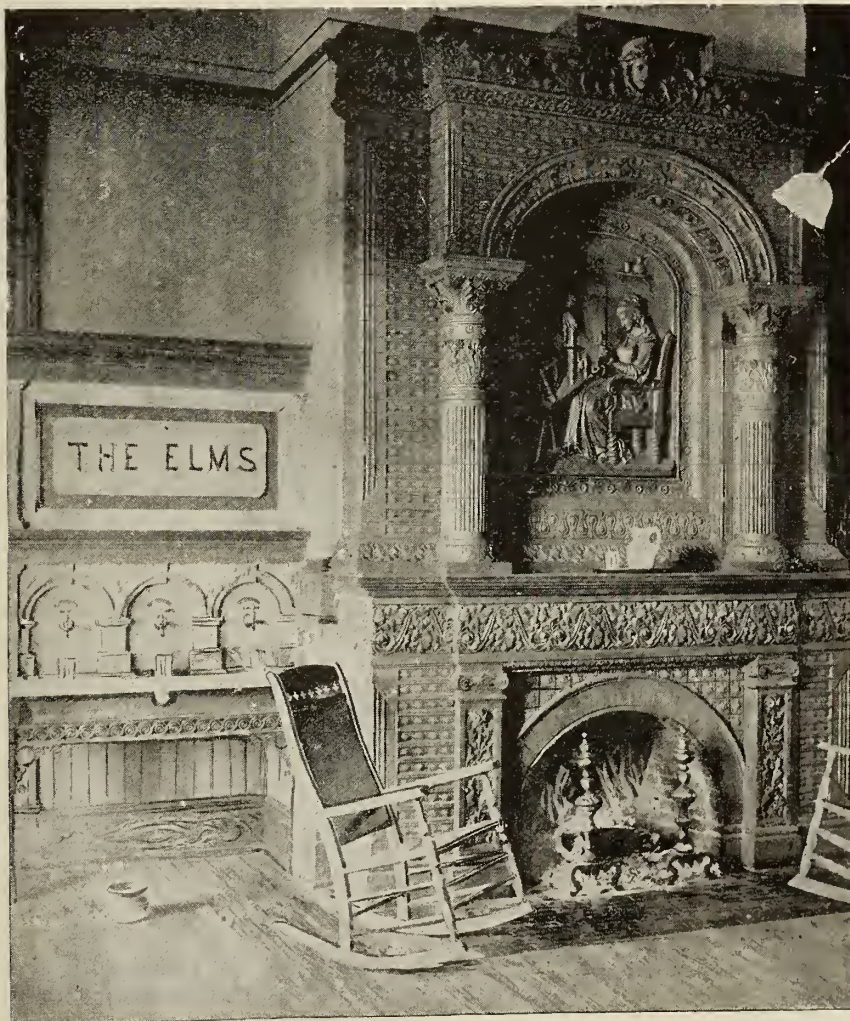
for a chimney, and another hole three feet square for a door. In front of this she builds a covered way, extending outward about three feet, and the exterior of the house is finished by a coating of "daub" or mud.

She then seeks the nest of the white ant, and digging them up, obtains a quantity of white clay, which she beats to powder, dries, and then, mixing it with water, kneads it until it is quite smooth. This she spreads all over the ground inside the hut, and beats it carefully until it is quite hard and free from cracks. This floor a good housewife will scour twice a day, with smooth stones, until it is like a piece of polished marble.

The fireplace is near the door, and is simply a ring of this clay to confine the embers in one place. The other necessities found in a hut are a bundle of spear shafts drying some tobacco and several bunches of millet hanging from the roof. Grouped around the walls are the three amasi (a species of sour milk) jars, the native beer jars and open jars holding grain.

Of course the dense wood smoke, rising, coats the roof, millet and tobacco with soot, and long "fingers" of it hang in every direction; but the floor will be clean enough to eat on, and as long as that is so, the social Mrs. Grundy, is satisfied.—*Ladies' Home Journal*.

HOWEVER great some men's abilities are, their liabilities are always greater.



and ties them with fiber obtained from the numerous creepers or "monkey ropes."

Then she twines thicker creepers in and out of these sticks, all round the circle of spaces about twelve inches apart, and then taking wattle (a kind of coarse grass or reed), she thatches the edifice, leaving a small hole at the top

THE ELEVENTH COMMANDMENT.

When Moses, with a reverent step,
The heights of Sinai trod,
And took the sacred graven stones
Delivered him of God,
The number of divine commands
Writ thereupon was ten;
But we have yet another one,
Delivered us of men.

By man 'twas given, and by man,
Though earth and heaven wept,
The ten would oft-times broken be,
That this one might be kept.
We'd rather risk the wrath of God
Than hear our neighbor flout,
And so we keep the one which says,
"Thou shalt not get found out."

What matter though the rest you break,
All, even to the end;
The rich man still will drink your wine,
The great will call you "friend,"
Fear not because the ten you break
Some may your presence shun,
For you will still be "in the swim"
If you have kept the one.

We cleanse the outside of the cup,
And as for what's within,
The standard of our righteousness
Is still our neighbor's sin.
That we are nearly on a par
There isn't any doubt,
Save he who breaks the one command,
"Thou shalt not get found out."
—*Alice O. Darling, in Good Housekeeping.*

Written for the Clay-Worker.

THE FUEL QUESTION.

No. 3.

GASEOUS FUELS, ETC., CONTINUED.

DEAR WILL:—I stand corrected, and very willingly apologize for the unintentional neglect manifested in not explaining "thermal units," so, without further ado about it, I will proceed with the explanation.

The British thermal unit—sometimes abbreviated to B. T. U.—is that *quantity* of heat that will raise 1 lb. of water to 1° F. This is the unit of heat, or thermal unit of the British and the Americans. There is also another thermal unit adopted by the French and used by countries where the metric system of measurement prevails. The French thermal unit, is the quantity of heat required to raise 1 kilogramme of water 1° centigrade.

I may here observe that the French thermal unit, is, as a rule, adopted by the scientists of all nations, being more rational and consequently much easier in calculation. Our familiarity with the Fahrenheit thermometer and the pound weight is the only reason why we retain the British standard of measures.

To make yourself quite familiar with B. T. U., take a pint of water—which in this case is near enough to call 1 lb.—take its temperature with a F. thermometer, which we will suppose shows the water to be at 32°, or just down to

freezing point; put it on the stove in a covered pan, and in a few minutes take its temperature again, which we will now say shows 92°; this then is a rise in temperature of 60°, consequently this pound of water has received 60 thermal units of heat. Again take 7½ gallons of water, which is of course 60 pints, and, therefore, 60 lbs., and supposing this water also to be at 32° F., put this on the stove in a covered pan as before, and in a short time take its temperature, which we will suppose now shows 35°; this you see is a rise of 3°, but as we now have 60 lbs. of water in our pan we multiply the 60 by the 3 and we say the water has received 180 units of heat. You will also perceive that if the pint of water had received as much heat as raised the 60 pints 3°, it would just have raised the pint to 212°, or, boiling point for $32^{\circ} + 180^{\circ} = 212^{\circ}$.

You will now see that the thermal unit is a simple and easy thing to understand and not so formidable a thing to stagger at after all; you must always remember, however, that the British standard is 1 lb. of water raised 1° F., while the French is 1 kilogramme of water raised 1° C., so when you read of hydrogen containing 62,000, or, to be more exact, 62,032 units, you may conclude that British units are meant; and similarly, when you read of hydrogen containing 34,462 units, the French unit is meant; they each represent, however, precisely the same amount, or quantity of heat, and carbon containing 14,544 B. T. U. is represented by 8,080 French units, which, I repeat, is the same thing, when the difference in weight and thermometer measurement are taken into consideration.

I must caution you against the conclusion that 1 lb. of any other substance raised 1° will measure the thermal unit, for it is not so. Almost every element and compound we know would give us a different standard to go by, for instance, it would require nearly 18 lbs. of silver, or, if we take gold, we must have nearly 31 lbs. to absorb our present unit of heat; by this I wish you to understand, that the quantity of heat that will raise 1 lb. of water 1° will raise 18 lbs. of silver or 31 lbs. of gold 1°, or, what would be the same thing, it would raise 1 lb. of silver 18° or 1 lb. of gold 31°. Now to go to the opposite extreme, 1 lb. of hydrogen would only be raised 0.293° by our thermal unit, in other words it would require 3.4046 units to raise 1 lb. of hydrogen 1°. When you read of fuel containing so many thermal units you

will understand that 1 lb. of the fuel is the weight containing those units; or, 1 kilogramme of the fuel, if it is in French units. The burning of 1 lb. of carbon, then, develops 14,544 units of heat and the burning of 1 lb. of hydrogen generates 62,032 units, which means they will raise respectively 14,544 lbs. and 62,032 lbs. of water 1° F. This has all been determined by very careful and exact experiments, and is universally accepted by men of science.

I think you will have no difficulty now in comprehending the meaning of thermal unit, I will therefore revert to the subject of water-gas, which I did not finish in my last letter.

If you will refer to the analysis given by Bunsen of "gases formed by the action of superheated steam on charcoal" you will find it contains 14.65 per cent. of carbonic acid; from this I infer that the bed of charcoal was of insufficient thickness, otherwise the 14.65 volumes of carbonic acid would have been converted into double the volumes of carbonic oxide, or 29.30 volumes, because each volume of oxygen would have combined with a volume of carbon, and, as I have just stated, would have produced 29.30 volumes of carbonic oxide. Now, if we add these supposed volumes of carbonic oxide to those 29.15 volumes found in the analysis we get a total of 58.45 volumes, which makes the volumes of hydrogen and carbonic oxide very nearly equal, and bears out the statement that water gas generated by passing steam through incandescent carbon, ought to give out about equal volumes of hydrogen and carbonic oxide. If carbonic acid is generated instead of the oxide then the volumes will be half those of the hydrogen. Whatever may be the number of hydrogen volumes liberated from steam there must invariably be half that number of oxygen volumes accounted for; either as free oxygen, carbonic oxide, or carbonic acid; when analyses do not thus account for the oxygen, I consider them unreliable.

The following five analyses are of gas made in gas producers having a closed ash-pit and supplied with blast by a steam jet; the general impression being that the steam is converted into water-gas. Very little investigation, however, is required to show up the fallacy of this idea, and to reveal the fact that the steam thus supplied, is condensed by the cold air rushing in with it, and by contact also with the air pipe before it reaches the fire in the gas producer. A

small fractional part of it may, and is no doubt, taken up by the air entering with it, to which it furnishes some of its heat, and this additional heat to the air renders it capable of carrying in a little more moisture along with it; now this is all that can reasonably be credited to the steam as fuel, the balance of the steam is deposited in the ash-pit as moisture.

I am aware this spoils a very pretty and widely cherished idea of the water-gas advocates, they fondly hope and believe that they obtain a very respectable percentage of fuel, in the form of hydrogen from the steam thus used. Now nothing could be more delusive than this plausible theory, and if you will only look at it carefully and patiently, you will discover that you have been entertaining and fostering a rather promising sham. Now look at it fairly for a few minutes; and even allowing that all the steam supplied by the jet is converted into water-gas. What then? Why the damaging fact still stares us in the face that *all the energy* of this water-gas we thus obtain is derived from the fuel in the producer. Hydrogen in water possesses no thermal energy; it gave it all up to combine with oxygen in the formation of water, and our oceans, seas, lakes, and rivers, are the result of this long, long ago conflagration. Hydrogen then, in the oxidized state has no place in the category of fuels.

Carbonic acid stands just in the same relation to fuel as oxidized hydrogen, they are both *residues* of what were once fuels, and now have no more claim to be classed as fuels, than limestone, sandstone, brickbats, cobblestones, etc.

This may be very unwelcome information, and I shall not be surprised at objections being raised, and I am quite aware you can furnish me with numerous instances of *alleged gains* in using steam for the production of fuel gas, but I must challenge you, or any one else, to *demonstrate* any additions to the heat units contained in the fuel of the gas producer, by the use of steam in the manner described. Now for the analyses:—

	1	2	3
Carbonic oxide....	26.89	23.41	23.60
Marsh gas.....	1.45	2.22	3.05
Hydrogen.....	11.55	13.82	10.55
Nitrogen.....	56.11	55.86	57.55
Carbonic acid.....	4.00	4.69	5.25
	100.00	100.00	100.00

These three are of the gas made by the Wilson gas producer, which is the

parent of all the steam jet producers. The two following are copied from the pamphlet of the Taylor Gas Producer Company. These people do not commit themselves by making inflexible statements about the composition of the gas they make. They say: "One ton of anthracite buckwheat coal produces about 166,000 feet of gas, containing, say, 136,000 heat units per 1,000 feet and the composition will average as follows:

Carbonic oxide.....	23.00	to	26.00
Hydrogen.....	15.00	to	12.00
Marsh gas.....	1.00	to	2.00
Carbonic acid.....	1.00	to	3.00
Nitrogen.....	60.00	to	57.00
	100.00		100.00

The next five are analyses of Siemen's gas:

	1	2	3
Carbonic oxide....	27.30	20.00	16.50
Marsh gas.....	1.40	1.20	2.70
Hydrogen.....		8.70	8.60
Nitrogen.....	67.40	61.40	62.90
Carbonic acid.....	3.90	8.70	9.30
	100.00	100.00	100.00

	4	5
Carbonic oxide....	23.60	22.30
Marsh gas.....	3.00	1.00
Hydrogen.....	6.00	28.70
Nitrogen.....	65.90	41.90
Carbonic acid.....	1.50	6.10
	100.00	100.00

To say the least, these analyses seem to me defective, and consequently unreliable. When I receive an analysis, I subject it to analysis, and if the quantities given can be reasonably accounted for I feel somewhat satisfied with the analyses, not otherwise. The unvarying laws of chemical combination and decomposition are safe guides in matters of this nature; so when I find that steam, in passing through incandescent carbon, has furnished 12 volumes of hydrogen, I invariably look out for the 6 volumes of oxygen that were given out at the same time. The atmosphere, too,—although its constituents are not in chemical combination—retains practically, a uniform composition; therefore, when I find it has supplied 60 measures of nitrogen gas, I am perfectly safe in my inference, that it also supplied about 15 measures of oxygen. By making due allowances for the elements supplied by the fuel, we can in this way check, to some extent, analyses.

I could give you a great deal more water-gas, and mongrel water-gas too, but I have no desire to asphyxiate you, or to even nauseate you with it, so will summarize so as to present at one glance

the amount of fuel and apparatus indispensable for making water-gas in sufficient quantity to replace 10 tons of medium bituminous coal burnt on an ordinary grate. If you will refer to my letter in the May number of the CLAY-WORKER you will find the fuel to be

14,183 lbs.	{ This is taken by the oxygen of the steam to make the carbonic oxide.
3,600 lbs.	{ To furnish steam for decomposition.
9,900 lbs.	{ To supply energy to 2,364 lbs. of hydrogen liberated from the steam.

27,683 lbs. Total.

Of apparatus there must be at least—

- 2 medium sized gas producers.
- 1 steam boiler not less than 30 H. P.
- 1 blast fan, capacity 2,500 cubic feet per minute, with power to drive it; and to this we may add boiler fittings, steam pipes and fittings, shafting, pulleys, belting, etc., also gas flues, valves, burner, etc.

Thus you see I make out a positive waste of fuel, and a very expensive apparatus to effect this waste.

You can form no conception of the amazing amount of energy required to overcome the chemical affinity of oxygen and hydrogen; I have heard people talk very glibly about the decomposition of water, as if it were one of the simplest and easiest things imaginable, but in practice it is not so. In Wilson's Inorganic Chemistry we read: "Pure water can be decomposed by electricity, but a very powerful battery is required for the purpose." Again, Faraday inferred, from the result of his experiments, "that more electricity was required to decompose a decigramme of water into its constituent gases than was developed in the course of a violent thunderstorm."

Now a decigramme is a trifle over a grain and a half; a decigramme of water would therefore yield one-sixth of a grain of hydrogen, this in bulk would be very nearly $7\frac{1}{2}$ cubic inches, or, about a wineglassful. Just think of a violent thunderstorm being required to furnish a wineglassful of hydrogen.

Now let us see what mechanical energy is required to decompose, say, 9 lbs. of water, or 9 pints call it; and to make it plain and easily understood, let two bricks that have been fused together in the kiln, represent the hydrogen and oxygen combined, as in water, we will now securely fasten one of the bricks to the ground, and attach a lifting apparatus to the other brick to tear them assunder; it may seem incredible, but it

would need a force of over 23,000 tons to effect a separation! When you comprehend this you will have some idea of the magnitude of the force of chemical action, and view the theory and practice of water-gas making in a different light. I must defer natural gas until my next letter and request you to be very patient, and read very carefully this and the preceding letter. If you lose your way, make your inquiries of those who know it.

Yours Paternally,

HYDRO-CARBON.

ROOFING TILES.

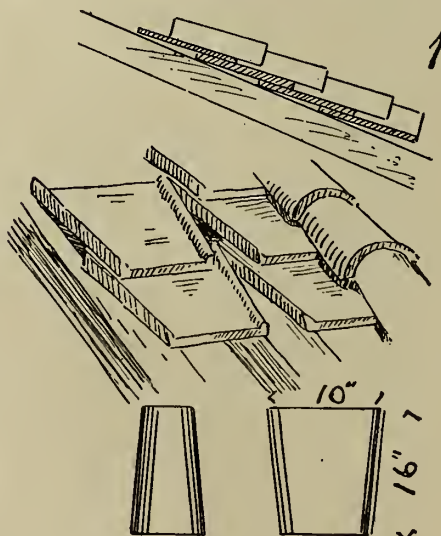
WE have to go into history very little for the demonstration of the virtues of constructive details which have to do with clay work. The virtues are demonstrated either by that which is immediately around us or has existence in the experience of those who are living at the present time. The manufacture of roofing tiles is conducted, to a limited extent, in America. Yet we may almost say it is a lost art with us; or, perhaps, one which has never been found. The patterns in use are not of the best nor of the handsomest designs.

The arguments in favor of a tile roof are too old and too numerous to need anything more than mere mention. If we stop to think about it, we know that the roofing material in general use is far from satisfactory. Slate, at best, is a temporary roofing; it is readily effected by the heat, so much so, indeed, that a little heat will expose all of the wood work of an ordinary roof to the action of fire. Shingles are as inflammable as it is possible to arrange the same amount of wood. Slate and shingles, as we know, are the general roofing material. Tiles, being a clay product, afford protection to all wood work under it, in a perfectly satisfactory way. The heat does not effect the tiles in the least. Frost effects them much less than slate. The covering of a roof with tile practically means not only the protection from the elements, but, as well, protection from conflagrations or any unusual or dangerous degree of heat. Heat, as we know, cannot effect burned clay products. This quality, together with its ability to resist other elements of nature, renders it the ideal building material. Its qualities of this character are quite as apparent for roof covering as for other use. For some reason, not easily understood, tile roofs have not been generally manufactured in America. While the field is open

and while there is a general demand for this material, it is not satisfied. There is difficulty in securing a satisfactory tile roof at a moderate price.

For the purpose of demonstrating the real value of tile roof I chose to go back into their history in France. There are many roofs existing in this country, which are not quite a thousand years old, and those of the tenth and eleventh centuries are common indeed. What better evidence of their quality can be asked? While it is true that these people have been making tile for over a thousand years there are yet those without experience who have the hardihood to invent and seek for introduction, tile coverings of novel design. There can hardly be such a thing as novelty in a tile covering. There can be no such a thing as an experiment. Nearly everything that we have in use in America to-day will find its counterpart in the old building of France. If it were a mere matter of history we could go back to the early time of the Asiatics and Greeks and thereby demonstrate the permanency, the general value and the ingenuity of their designs.

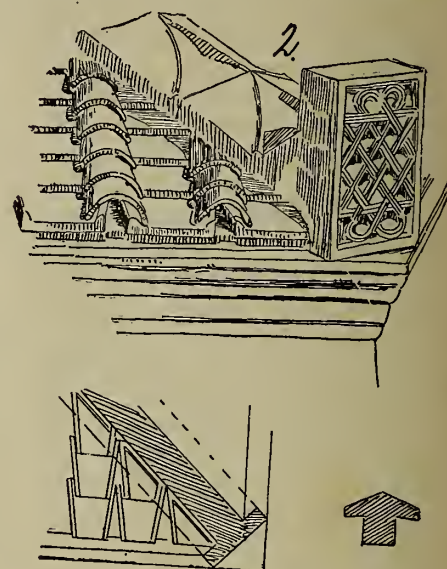
The use of tile in France for eight hundred years is easily traced, and we may easily call it the modern history of tiling. It has had practical existence under all conditions during that time. It has made substantial progress. We may take the design which is shown by Figure 1, analyze it, study it, and find



that it is rational, economical and suited measurably to the requirements of the people of this time; not that they would care to use it just as it is, for the reason that there are yet better forms; but if there were nothing better available, it would answer a good purpose. We may

see that during all the time which has followed the use of this tile many substantial improvements have been made, and at the present time the little that is new may be expected.

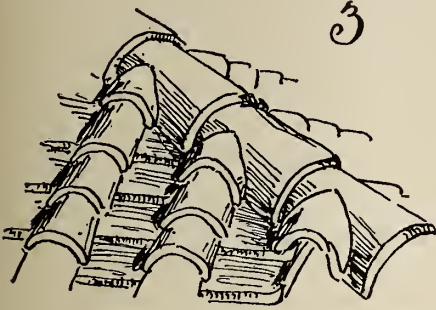
To indicate the availability of this form of tile I may state, that in the rear of our apartment in Paris, there is a building about three hundred years old. It is covered with tile not greatly differ-



ent from this one. They had exactly the same trouble with it that was peculiar to this, viz., on the ridges and hips. In looking up the history of the tile shown in this cut it is found that a large use of mortar was made on the hips and copings. This is true of the local instance which I here mention. They have run a straight piece of tile up the hips intersected it with the coping and the half round tiles by means of clipping and mortar. While we know that this tile pattern was brought into France by the Romans, it is not possible to identify the period at which they were made by the forms which we see at the present day. We may know the date of the idea, but not the date of the manufacture of the tile. These different forms which have been developed during different periods in the past have been copied during the more recent years, and in this way certify to the original value of the idea.

During the eleventh and twelfth centuries the form of hip covering shown in Figure 2 came into use. It is to be observed that the old Roman form of tile was used, though it was of a larger size. The hip covering shown was of stone and of the form indicated. The great weight was not a matter of any serious importance at that time, as most of the

ceilings over which it was used were of stone vaulting and of a character to stand any amount of superimposed weight.



The next improvement came along during the latter part of the twelfth century. Its peculiarities are indicated by Figure 3. It is to be noticed that the only change made is in the hips, the cover tiles themselves being of the old Roman form. The ridges were made so as to be a mere continuation of the hip. It is this kind of tile which we see on the old Romanesque buildings of Southern France and Spain which give them their wonderfully picturesque appearance. It is evident from the style of the design that many of these structures were recovered during the twelfth and thirteenth centuries. This is proved by the fact that the older fragments are now to be found over the tops of the vaults. They did not take the trouble, at all times, to throw the old fragments to the ground. From the difference of their detail and size and the remains of the fragments of coping we have before us a little positive history. The copings and ridges appear to have given the most trouble. In Figure 3 we have the tile which best combines the greatest beauty with utility which is to be found down to the latter part of the twelfth century.

There are other forms of tile which came into use in particular provinces of France, which will be considered in a subsequent article. By studying the detail in connection with the history of these tiles we may derive much useful information in connection with their use at the present day. We may understand the thought which gave them origin as well as the form itself, and thereby be enabled to make varying and intelligent reproductions. While we may not care to reproduce the tiles of the twelfth and thirteenth centuries exactly as they were made at that time, there are certainly forms in connection therewith and ideas attached thereto which are valuable. LOUIS H. GIBSON.

Paris, April 16, 1891.

Written for the Clay-Worker.

ADOBE BUILDING BLOCKS.

BY BRIX.

I REMEMBER some twenty-four years ago of seeing a house that was built of what might possibly be called an adobe block or concrete block, such as I have never seen described nor have I seen any built in the same manner elsewhere.

The house spoken of was in Calhoun County, Texas, about thirty miles northwest of Indianola on Green Lake. I was, at the time, not very much interested in bricks and brickmaking; but the novelty of the case, both in the way of the material and method of manufacture, was what interested me.

There is, all through that section of the State, lying contiguous to the coast, immense beds of fossil shells, several feet in depth; and some of these lie near the surface, or are exposed on the banks of the lakes, or gulches, and ravines, washed in the prairies. These shells are utilized, or were at the time, by being burned into lime, for any and all purposes for which lime is used.

The manner of burning the lime was new and novel to me, as well as the use to which it was applied afterwards. A hole was dug in the earth, usually about seven or eight feet in depth, and ten or twelve feet square. The bottom of this hole or pit was overlaid with cord wood, two or three sticks in depth; and at the corners provision is made for a flue, by building the wood up across the corners in such a way that fire could be started in the bottom of the pile. Over this layer of wood, these fossil shells were shoveled to the depth of a foot, or nearly so; then a layer of wood on the shells, and shells again; and alternated in this way till the hole was filled and on up in a conical pile of wood and shells, till it was five or six feet above the ground.

The shells as dug from the bank had a considerable percentage of sand, gravel, and pebbles among them, which was allowed to remain, and did not burn into lime like the shells. The pile was then fired and tended till the whole was all burned out, and more wood added, if needed, to calcine the whole mass of shells as nearly as possible.

This mass was then allowed to cool down, and coarse sand and gravel with the usual admixture of small shells as procured on the lake shore, was added and the whole was mixed up together in the form of a concrete, and molded into bricks about twenty inches long, ten inches wide and six inches in thickness;

after they had sufficiently set, they were turned out of the molds to dry; after which they were laid in place like blocks of cut stone, with a white mortar joint.

This form of building block was unique, from the fact that the ashes and fine charcoal when mixed up in the mass, tinted them throughout a uniform lead or slate color; and while the appearance of the house at a distance resembled stone, yet on a closer inspection the blocks showed a goodly amount of pebbles, pieces of charcoal, and unburned shells, interspersed all over the outside of the bricks, giving the whole house an odd appearance. Doors and windows were set in the wall as in an ordinary brick or stone house. I was informed that this style of house was quite common in the neighborhood of the shell beds.

Later in the year we saw numbers of adobe houses in San Antonio, that were built of the clay of the prairie tempered to the consistency of a soft mud and made into bricks and laid in the sun to dry, and laid up with a mud mortar, or in some cases were built by setting up rows of posts in the shape and size as desired, about two or three feet apart, and the space filled in between with mud; openings being left for doors and windows as desired, by putting in a lintel or sill, as needed. The house was covered with a thatched roof, of prairie weeds, and covered with a layer of the same mud as the walls, and over this another thatch of the long straight weeds. The floor was simply the earth beaten hard and kept dry. These houses were usually built and occupied by the Mexicans, who made a considerable part of the population of San Antonio at that time.

THE BEST FIRE RESISTERS.

Investigations of fire ruins show that porous terra cotta bricks and blocks best resist fire, water and frosts; next to these in the order of fire resisting qualities being the various concretes, or some of them, and burned clay work. In the best building work now done the iron parts are incased in porous terra cotta, tile or brick work in roof, floor and tile construction; the hollow tiles are faced with vitreous tile, slate, or any good weather-proof coating, or with a single thickness of brick. Incased in fire-proof materials, iron and steel work is claimed to give the best results. —Chicago Tribune.

BRICK PAVEMENTS.

Sand Foundations Vs. Stone and Cement

HARD or vitrified brick for street paving is coming into use rapidly, through the Central and Northwestern States. Speaking of States, our country has grown so rapidly that we find it difficult to designate the States so as to be definitely understood. States that were once known as Western or Northwestern are now Central or Northern or known in some other division, in the late geographies. It is better to say that in the States of West Virginia, Ohio, Indiana, Michigan, Illinois, Missouri, Iowa, Kansas, Nebraska, and other States, vitrified brick are being used extensively for paving streets.

There are other paving materials that are competing against brick, and objections are urged against brick by those interested otherwise, but notwithstanding the effort to create a prejudice against their use, brick are at the front.

There have been no combinations of large plants, or immense sums of money pooled to advance the vitrified brick paving interest. Large plants for the manufacture of paving have been constructed in the past year or two, and others are being constructed, but the demand exceeds the supply by many millions. To-day there is not a more promising field for the investment of money and brains than in the manufacture of paving brick. The leading paving brick works are behind on orders and are likely to be for some time to come.

At this point it is well to suggest, we think, some mistakes that are likely to be made. We mention first the use of poor material. In the rush to get brick and go on with the work, it is altogether probable that brick will be used that are not up to the standard of merit that should be required. If the well earned merit of vitrified brick as a paving material is maintained it will be by using only the best brick. The best brick are made from good clay—clay that is composed of the necessary ingredients to make a hard tenacious body, when sufficiently burned. The clay should be thoroughly worked and rightly tempered, and so closely compacted when formed into brick, that when vitrified they will not absorb water.

Another important fact in the con-

struction of pavements is to have a good foundation. The foundation should be well underdrained—dry firm earth. A foundation that will not become spongy or soft at any season of the year. This can be secured at a small cost, comparatively speaking, by underdraining with two or more lines of tile drains.

There are towns and cities where there is sand and gravel underlying two or three feet of the surface earth, which provides sufficient underdrainage.

After the street or travel-way has been brought to the desired grade, leveling and firming the same, we favor the use of sand five or six inches in thickness, as a cushion or bed, upon which to lay the



HON. ANTHONY ITTNER, BRICK MANUFACTURER, ST. LOUIS, MO.

first course of brick, sides down, evenly, and settle them firmly on the sand. Then cover brick with another cushion of fine sand two inches thick, setting the hard pavers on edge as closely as it is possible to set them, setting them evenly, covering the pavement with another coating of sand one inch or more in thickness, to fill the interstices, by the travel, after which the street may be kept clean.

We favor this method of construction because it has been thoroughly tested in many of our large towns and cities. The oldest pavements in use are bedded on sand, and they have proved satisfactory in every instance, where the underdrainage was sufficient.

But why not use a stone or cement foundation? Such foundations are being recommended by civil engineers. We favor sand cushions, for the reason that there is an elasticity to sand that will prevent the cracking or breaking of the brick from hard blows. If a hard paver was handed to us to break with a hammer and there was an anvil and also a bed of sand convenient, does anyone suppose that we would set the brick in the sand to deal it a hard blow, in preference to setting it on an anvil? We think not. If we are intent to deal a blow that will crack or break the brick we would select a rigid foundation for the brick.

The same reasoning holds good in the construction of a pavement—the cement foundation is a rigid foundation. It sounds very well to talk about good foundations, stone, cement, etc., but the best proof is the result of practice, and the sand cushions have proved their excellence when provided with dry foundations.

Besides we are suspicious of the advice of men who advocate the use of stone, asphalt and wood for pavements, who tell us: "Oh, yes, brick will do if there is, first of all, a foundation of broken stone, a foot in thickness, and then set the brick in cement and run pitch into the interstices." Yes, yes, we understand; such a construction would bring the cost up to that of other pavements, such as stone, asphalt and wood. In addition they will add: "But brick have not been fully tried; it may do for light travel." But the fact remains that brick pavements bedded on sand have been in use from ten to seventeen years, that they have been subjected to heavy travel, that they are in good condition to-day, which, in our judgment is pretty good proof.

We are not interested a dollar in any brick paving plant, or a contractor, to influence our judgment. We have visited, perhaps, a score of cities, where they are constructing and using brick pavements—some of the oldest pavements in use, and we have examined them carefully as to the method of construction, and we have come to the conclusion that those who have had the experience of years in the construction and use of brick pavements, are right in the methods of construction, that they are guided by the lamp of experience.

It is all very well for those who are interested in the use of other material for pavements to recommend the more expensive methods of constructing brick pavements, when, in fact, the use of sand cushions is the better method and less expensive.

What every good citizen wants, where he is not financially interested otherwise, is the best pavement for the money. The durability, ease of travel, cleanliness, quiet, and best sanitary provisions being secured. And we unhesitatingly and confidently affirm that good vitrified brick pavements constructed as they are, where they have had large experience, meet the demand required. PETER SIMPLE.

Written for the Clay-Worker.

GOOD BRICK AND GOOD BRICKWORK A VERY IMPORTANT MATTER IN POLITICAL ECONOMY.

BY J. W. CRARY, SR.

THE average reader will ask, What has brick and brickwork got to do with political economy? Political economy is the science of human government; and has no more connection with party politics than the Christian religion, pure and simple, has with sectarianism. Abstractly speaking, all human government is co-operative, and especially so with Democratic, Republican government. Every man's interest, directly, or remotely, is connected with other men's interest. All taxation, or cost of living, or cost of government, comes directly or indirectly on the individual. A tariff for revenue is an indirect tax on the individual, and so, all policies of insurance, are indirect taxes on the individual citizen, as well as a direct tax on the persons who are directly insured. The cost of insurance is charged to the expense account of every business man, and if he be a merchant, he adds the premium for insurance to the price of his goods, and his customers pay it. If he be a landlord, he adds the cost of insurance for his tenements to the rental of his tenants. So that insurance policy is nothing more nor less than a vast system of co-operative risk, or more plainly speaking *gambling*, by mutual consent and for mutual benefit.

Now let us see, what good brick and brickwork has to do with political economy. It is scarcely necessary to say, that every intelligent man knows that the difference in cost for a risk, between a well built brick home, and even the very best built wooden house, is at least

double, then if we add the liability of wooden buildings to decay, to the extra cost of insurance, we find that in a run of about ten years, the wooden building has cost more than the brick building, of the same style and dimensions, and in twenty years the wooden building is nearly worthless, while the brick building of the same age, is, comparatively speaking, a new building; and all this difference in expense and loss falls on the community at large.

As a rule, the first cost of a brick building is not over thirty per cent. the cost of a wooden building of the same size; and the ground or real estate value is increased by building on it with brick. Of course this argument has no force, where wooden buildings are prohibited. But at least two-thirds of the buildings in the United States are of wood, or of combustible and decaying material.

I do not know that reliable figures could be had, to show just the aggregate cost for insurance risk, but \$200,000,000 would be a safe, low estimate. So that the people at large incur a useless expense of \$1,000,000 annually, for the bad economy of wooden buildings. But it is said, that all persons who build houses are not able to build with brick, and that if they were, the brick could not be had in time and at fair prices.

[TO BE CONTINUED.]

Written for the Clay-Worker.

A FEW DON'T'S.

Don't use rosins on your belts unless you want to ruin them.

Don't use short belts without tighteners, a tightener will save you much time and money.

Don't have any open ditches about your yard, use tile; open ditches should be unknown on a brickyard.

Don't be above learning anything. None of us know all. We are learners always—even on a brickyard.

Don't be cranky with your men, it will not pay you to lose their good will, and they will go about their work too-half-heartedly to pay.

Don't send your orders for supplies late in the season, profit by the experience of others, send your orders early and avoid delay. Be prompt in this matter.

Don't forget to attend the annual sessions of the National Brick Manufacturers Association. The mutual exchange of ideas at these meetings will prove helpful to you; but, remember, your best,

your most valuable, education in the art of making good brick, will—yes, must be gained on your own yard.

Don't refuse to listen to any suggestion your employees may make, especially if you are new at the business. The suggestions of your employees may prove valuable to you.

Don't forget that a good team of horses are necessary around the yard. You will find that it does not pay to hire all your hauling done. A team will save its cost to you every year.

Don't think that you can get your clay to the machine with wheelbarrows as cheaply as it can be got there with carts or ears. Wheelbarrows are good in their place, but that is not in your clay bank.

Don't have any blue Mondays or any other blue days, be cheerful with all around you, for as the sunshine is necessary to dry your bricks, i. e., if you use no dryer, so the sunshine of character is a potent factor in making things move smoothly around your yard. SWIPE.

ADVERTISING THAT PAYS.

SUCCESS in advertising results from a close observance of a few well-established principles. The first is to know what parties are to be reached. A steam engine is used by comparatively few people; patent medicines by nearly everybody, and each dealer must know who will probably be his patron, and where they are to be found. The second is that the medium employed be adapted to his wants. A family paper is excellent for the patent medicine man, but worthless for the machine. The paper that is often referred to by its readers is to be preferred to the one which is simply glanced at and thrown aside. This accounts for the wonderful success of the trade journals, and their development within the last ten years has been astonishing. It is said that some of the great dailies instruct their solicitors to seek no advertisements which interest merely a class of readers, and to confine themselves to those of the most general nature. An illustrated paper is far better than an unillustrated, and the fresher and finer the art, the more valuable. The medium, of course, must have a circulation, and in these days of close communication, the more national it is the better still.

In the next place, a great deal depends on the wording of an advertisement. It must convey just the ideas needed in the most spiey manner—just enough to

attract and interest the reader—no more.

The price paid is a matter of little consequence, though, as a matter of fact, those journals which charge the highest prices are, in the end, the cheapest, for they have a circulation to warrant their action.

Of course, different men and different enterprises will advertise by different means. They will paint rocks and barns, but those who advertise the most extensively claim their best returns come from the periodicals, and it is remarkable how closely these pages of our monthlies are scanned by all classes. But whatever means one adopts, the fact remains undisputed that advertising is the one factor of our business life to-day. Fortunes are made by it, and skillful

THE ROME BRICK COMPANY.

THE above named company is one of the most successful brickmaking firms in the new South. Their works are located near Rome, Ga., a thrifty little city, midway between Knoxville, Tenn., and Atlanta, Ga., which, for several years, has been the home of our well-known contributor, "R. Brick," who is connected with this company. The Rome Brick Company has a paid up capital of \$100,000, and the annual capacity of their works is fifteen millions of common and three millions repressed and ornamental bricks.

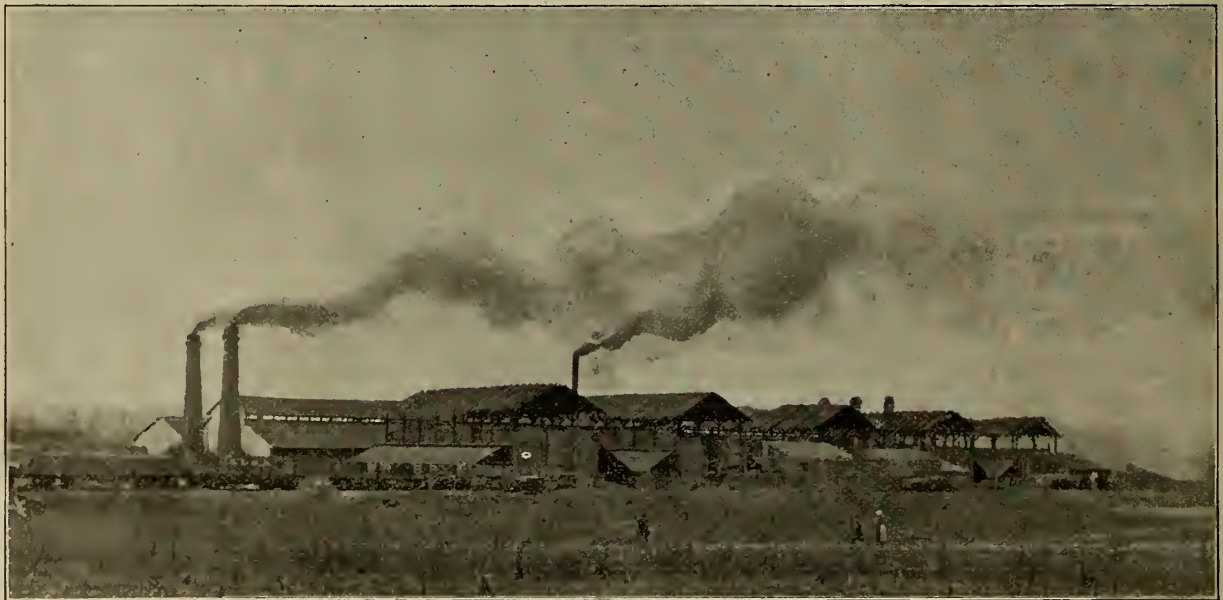
They own ninety acres of land. About one half of this is clay of excellent quality, with an average depth of twelve feet.

Mr. J. L. Camp, one of the most enterprising business men in the South, is President of the Company; H. H. McClure, Secretary and Treasurer; R. B. Morrison, General Superintendent.

They blast their clay with powder, then flood it with water, and allow it to soak a week or more before using; it is then brought to the machines by a steam hoisting drum.

The power is furnished by a one hundred horse-power Harris corliss engine, one of the best that is made in this country; two one hundred horse-power boilers, only one being used at a time.

The common bricks are made on three Sword machines. The brick for repressing are made on a Henry Martin soft mud machine; it has no superior for



THE ROME BRICK COMPANY'S WORKS.

advertising men are paid the highest salaries. No man can say now, as did a writer in *Chambers' Journal* thirty years ago, that he had never bought anything because he had seen it advertised and hoped he never might, for he would deprive himself of nearly every necessary of life.—*Natl Real Estate Investor's Guide*.

Bricks impregnated with tar are said to be hard, durable and perfectly waterproof. The process of impregnation is simple, ordinary bricks, or still better, machine brick being boiled in coal tar for twenty-four hours. Bricks thus treated are claimed to be especially well adapted for paving workingrooms, depots, etc. They are recommended for the construction of sewers, cess-pools, the insulation of foundation walls and similar purposes.—*Ex*.

About one half of this clay bed is composed of brown and yellow clay, that burns a rich red color, making a strong brick. The other half is light gray in color, tough and plastic, resembling potters clay, burns bright red, and makes an ideal brick for street paving, very dense, with the ring and strength of iron.

They are at present filling an order for a half million pavers for the city of Savannah. Their trade extends over a large territory, including the States of Virginia, Tennessee, Georgia, Florida, Alabama and Mississippi. They are most favorably located with regard to shipping facilities, as well as procuring of fuel supply. Seven lines of railroad radiate from Rome in different directions, also two navigable rivers. They have direct routes to the coal mines of East Tennessee, N. Georgia and N. Alabama.

making soft mud bricks. They have four Carnell, two Raymond and two Kueny hand presses, on which are made the repressed and ornamental bricks.

They have two hot floor dryers, that hold eighty thousand bricks each, and two floors heated by exhaust steam, that hold forty thousand bricks each. These are used exclusively for drying repressed and ornamental bricks.

Their entire product is burned in the Morrison improved kilns, five in number, each holding three hundred and fifty thousand bricks. They set forty-four courses high and have only two courses of salmon brick on top. Burn with coal slack and use coke and wood to water-smoke. One man in day-time and one at night does the watersmoking, and two men in day-time and two at night do the firing after the kiln is dry until

done burning. Ninety per cent. of the bricks are hard, actual waste about one half of one per cent.

Bricks are taken from kiln to car on wheelbarrows.

The Company own nineteen double cottages for the families of their employes, also a dwelling each for the Superintendent and Engineer.

The main building, which includes dryers and engine and boiler houses, is three hundred and fifty feet by one hundred and twenty feet. They run during the entire year and pay their men every Saturday. A water main runs the whole length of the main building, with hydrants fifty feet apart, to be used in case of fire. This water main is connected with two Knowles force pumps. The water flows to these pumps through a four-inch pipe 500 yards long, the supply coming from a lake at that distance.

PAVING BRICK.

Manufacturers of paving brick will find the little 48-page book entitled "Durability of Paving Brick" a very valuable aid in introducing brick in localities where, from lack of information, the value of brick as a paving material is questioned by those in authority. It is an authentic statement of the comparative merits of the principal paving materials and proves conclusively that brick is equal or superior to all others. It should be distributed generally by those interested in advancing the paving brick interests. Price of single copy 25 cents. Special rates will be made to manufacturers ordering large lots for distribution. Address the publishers, T. A. Randall & Co., Indianapolis, Ind.

OLD AND NEW.

The Michigan Brick & Tile Machine Co., Morenci, Mich., has been incorporated and elected James F. Clark, President, and Jno. H. Campbell, Sec'y and Treas. This is not entirely a new firm but an old one under a new name, and with some "new blood" and additional capital, made necessary by the constantly increasing demand for their brick and tile machinery, of which they manufacture a large variety. They have enlarged their machine shops and with the increased facilities, expect to be able to fill all orders for machinery more promptly than they have been able to do heretofore. They have some improvements in brick machinery that the craft will do well to investigate. See their "ad." on page 629, or write them for illustrated catalogue.

CORRESPONDENCE.

THESE COLUMNS ARE OPEN TO ALL. THE FULL NAME AND ADDRESS IS REQUIRED BUT WILL NOT BE PUBLISHED EXCEPT WHEN PERMISSION IS GIVEN BY CORRESPONDENT. THOSE DESIRING TO COMMUNICATE PRIVATELY WITH ANY CORRESPONDENT WHOSE FULL NAME IS NOT GIVEN CAN DO SO BY ADDRESSING LETTERS CARE OF CLAY-WORKER.

A Fair Conclusion.

Editor Clay Worker:

The voice from the "Rockies" in your May number is still echoing in my ears. It needed no signature to tell the veteran of the N. B. M. A. from whence it emanated. Brother McCain's allusion to a machinery exhibit in connection with our annual meeting moves me to say something on that subject. Said allusion would seem to convey the impression that our National Association members had heretofore objected to exhibition of brick machinery in connection with our annual meetings. Such impression is erroneous. At Cincinnati and Chicago the exhibit was one of the distinctive features of our meetings, and my judgment is that the machinery manufacturers made a great mistake in not continuing to show their goods. As I recollect the circumstances, they objected on the grounds of cost. What I criticise in Bro. McCain's letter is the advancement of the idea that the Association had in some way prohibited the exhibition of machinery. What we have endeavored to prohibit, is discussion in open convention of the merits and demerits of different machines. This, I still think should be done, so long as the machinery exhibitors and manufacturers are members of our National Association, having equal rights and privileges with us; but I am not sure that we as manufacturers of brick would not be the gainers financially, to bar out the machinery men from our membership and open the doors for discussion and criticism. Many of us dislike for various reasons, to tell *all* we know. Some of us feel a delicacy about relating our mistakes in detail, while others whose personal relations with machinery men have been more than friendly would hesitate to be critical, lest those relations should be sundered. In short, as a matter of dollars and cents, the fraternity would be the gainer if we could have in plain sight, the good and bad qualities of each and every machine in practical use. What a circus a National Convention would be if each member should truthfully relate his experiences, pointing out to the best of his ability the weak points and defects of the various machinery he had used. And then sup-

pose fifteen minutes were given each machinery man for defense. Think of Chambers, Penfield, Eudaly, Frey, Sheckler, Cunningham, Wolff, Sharer, Drake, Raymond, Boyd, Tiffany, Fletcher, Potts, Nolan, Martin, Knapp, Simpson, etc., opening their flood gates of eloquence in favor of their product and against all the rest. I hope never to be too old to enjoy a little fun, and there would certainly be enjoyment for the time being in such a debate as this. Seriously, I much prefer that the present arrangement should continue. Every brick manufacturer has more or less business with the machine man. So far there has been no friction, no unpleasantness. Under our by-laws both classes have equal rights, and peace and good will exists. Let it be continued. D. V. PURINGTON.

New York News.

Editor Clay-Worker:

Without a doubt the present is the most gloomy period that has ever been known in the brick trade of this part of the country. If I were so disposed, and the CLAY-WORKER was several scores of pages larger than it is, I could bore your readers with the reasons for the present awful state of affairs. It would include the strike of the brickmakers of last year, and the present troubles in this city of the lumber dealers, the lumber handlers and the iron workers, together with the strikes and grumbings of the housesmiths, framers, etc. It makes one positively melancholy to think how labor is cutting its own throat by these disturbances.

It is driving capital away from Gotham at any rate. Our builders and capitalists have viewed the situation calmly, have come to the conclusion that work was out of the question, have pigeon-holed plans for goodness alone knows how many millions of dollars' worth of building, and have sailed away to Europe, determined to do nothing whatever until matters are in a more satisfactory condition.

How it is all going to end I doubt whether there is anyone in this city that can give even a shadow of an opinion. There is positively no building being done in this city, and very little, indeed, in Brooklyn. As for bricks, they are not "in it" with a vengeance. Prices have declined right along all during May, and prices for Haverstraws are down to \$3.50 to \$5.50, with Jerseys out of the market altogether. There are about twenty millions of brick in the market.

Pale brick, if it is very handsome, can be sold for from \$2.00 to \$2.25 a thousand.

This is how a prominent brick manufacturer that I saw the other day, photographed the condition of affairs in a very few words. He said:

"There is not one-tenth of one per cent. of the usual work going on at this time of the year, being done now. The brickmakers up at Haverstraw are working, but what are they doing it for? Simply because they have set the kilns burning and they believe in keeping the fires up, for a time at least. But instead of burning way into the fall as they usually do, they will just fill up their yards and sheds to their capacity, and stop about the first of July. Nobody sees daylight, and there is not a ray of hope."

Among the plans of the month is one for a mammoth fire-proof hotel on 18th Street and 5th Avenue, twelve stories in height, and 175 feet by 98 feet 9 inches in size, and a new club-house for the Mendelssohn Glee Club in 40th Street, between 6th Avenue and Broadway to cost \$200,000. BRIC-A-BRAC.

Use and Waste of Fuel.

Editor Clay-Worker:

If Mr. S. P. Crafts will read my copy book maxim over again, he will find in it the word "sometimes;" which greatly modifies the construction he has put on it; further, the question following the maxim confines the matter of *opinion* to the assertion made at the Convention.

I fail to see the relevancy of the mother and son's brief correspondence.

I think Mr. Crafts would readily adopt any gaseous theory in which he could clearly see even a saving of 25 per cent. over his present method of burning coal in his portable furnaces, but I think a *superficial* reading is not sufficient to enable any one to understand the theory, or to see a possibility of such a gain.

Mr. Crafts says he burns 8,447 bricks with one ton of coal and if I effect a saving of 50 per cent. by my system I ought to burn 16,894 bricks. Not necessarily so, Mr. Crafts. If you pay \$4.20 per ton for lump coal and I gasify slack coal at \$2.10 per ton and burn 8,447 bricks you will admit I effect a saving of 50 per cent. in the *cost* of the fuel. You state that wood costs you twice as much as coal, so that 8,447 bricks burnt with wood cost \$8.40; my saving in this instance would be 75 per cent. of the cost for fuel. This is the possible saving by simply gasifying the fuel first, and burn-

ing it *inside* the kiln afterwards; in this there has been no saving of heat by regeneration, for, with the class of kilns used by Mr. Crafts regeneration is not practicable.

I do not claim I can purchase slack coal at New Haven, Conn., for half the price of lump, but in Illinois, Iowa, and Kansas, it is less than half price of lump.

Mr. Crafts goes on to say: "Mr. Waplington, if I understand him, puts his fuel into a domed cupola, and by the combustion of a part of it, develops gas for burning brick that puts coal away in the background." This I may observe is a mild and modified iteration of the proposition fired at Mr. Davis during the discussion at the Convention; and candor compels me to say that Mr. Crafts and I hold widely different views on the subjects of fuel-gas, and the laws of combustion. The balance of the paragraph I have just quoted from, consists of three pertinent questions. My reply to the first two are, that I fear Mr. Crafts does not understand me. If he will be kind enough to wade carefully through my Convention paper as published in the special number of the CLAY-WORKER, I think he will either understand me better, or be able to correct me where I am in error. The third question contains the gist of the other two, and as Mr. Crafts is not prepared to accept the theory of combustion as I have been taught it, and which I find quite true and satisfactory in practice, I must content myself with a simile which is quite familiar to him, and reply, we obtain more heat by making and consuming gas in separate vessels, nearly on the same principle as we obtain more light from gas than we could from a grate of blazing coals.

Mr. Crafts is evidently under the impression that if unconsumed gases pass up through a kiln of white hot bricks, that gas will surely be burnt, and is, therefore, unprepared to accept my statement that gases under such conditions, instead of burning and giving out their heat actually absorb heat from the bricks and consequently cool them. So much then for the products of combustion, or, rather the unburned gases passing up through a hot kiln. This is not book theory, nor an untried hypothesis of my own, but a fact picked up in *practice*, before I knew anything of the theory. The "cooling off" with unconsumed gases, is universally practiced where gas producers are in use for fuel gas.

Mr. Crafts and I pull together when

he says: "You cannot get more heat from coal than there is in it." Very true, but sending all that coal except the ashes through your furnace and then through the kiln is not sufficient evidence for me that you have generated all the heat that coal contained, nor that you have utilized even that portion you did generate, however satisfactory you may feel on that point.

I have confined myself, so far, to the generation and utilization of heat. I will not presume to coach Mr. Crafts on the best kiln for his purpose nor on the most economical method of running a brickyard. I am much pleased with his letter, although there seems to be lurking behind a large portion of it that quiet unruffled satisfaction, which, expressed in words would say: "Now, my friend, beat that if you can." Nevertheless, I like it all, and am very pleased his portrait appears in the same number. I think the portrait scheme a very good one.

There are points in this letter that I have left untouched, but by no means unnoticed, and shall be pleased if he will write again, for if I cannot have the satisfaction of proselyting him I shall derive much benefit from his vigorous resistance. - WM. WAPLINGTON.

Enameling Brick.

Editor Clay-Worker:

Perhaps my closing remarks in my last letter may be taken to be an insult to the common honesty of the brickmakers in general, as I see from the remarks made by one gentleman at the Convention that brickmakers in America have revived the ancient law and practice, of having all things common, remarking at the same time, that in England a hundred years ago, works were closed and secrets well guarded, and that there was no admittance except on business. I can assure that same gentleman that he need not go back to ancient history to find an example of English exclusiveness, (perhaps he would call it selfishness), for it is far more rampant now than it were possible for it to be a hundred years ago. My advice was based on fact and on the assumption that human nature was the same the world over, and, despite this gentleman's assurance to the contrary, I quite think it is only so recently as about eleven years ago, one manufacturer I know, entered an action at law against another, for enticing his man away from him. While this lawsuit was

pending the man slipped off to America. This man had never made enameled brick before he made them for this firm, and, judging from what we can learn of the state of business in America, he can never have made any since; but somebody may have had to suffer just a little, if the facts could be known, and, I dare say, that if any gentleman or company should be so unfortunate as to sink fifteen or twenty thousand pounds in discovering the processes of manufacture of a specialty of great value in clay work, he or they would not care to have a visiting committee coming around to take notes and make a report of such processes, from which another company might be successfully started, in the same locality. It is very easy to throw an apple into an orchard, or to be generous when you expect to receive more than you give. I differ with our friend in his conclusions, in which he appears to infer that clayworkers in America have got past this—exclusiveness. My own opinion is that they have not come to it, or, if they have, it is only to the fringe of it. When strong companies have waded up to their necks through difficulties and loss of large amounts of capital to develop a business in some of the higher branches of the ceramic art, then will be the time to test your neighbor's generosity, and if his exclusiveness does not excel the McKinley tariff, I shall be very much deceived.

There is more to be said on the text, but we will leave the rest to be worked out by our hearers when they get home, and return to our subject by giving a list of all the materials used in enameled brickmaking:

Ground feldspar, ground flint, ground Cornwall stone, ground quartz, ground whitening, ground fluor spar, sulphate of barytes, ground flint glass, china clay, ball clay, potters white shavings, bone earth, ground pitcher, plaster of Paris.

These are all that we call dry bodies (except the glass) and from these all brick glazes and enamels can and should be made. Many fluxes have been used to make the glaze run at a lower temperature, but they are not necessary; indeed, they are one and all detrimental—some in one way and some in another, but they are here for what they are worth:

Common soda, carbonate soda, soda ash, borax, boracic acid, nitre, alum, white lead.

These things are used in glaze for various purposes but should never be used in brick glazes. They will not stand

fire. Soda, nitre and alum, will melt on a hot plate—borax and boracic acid fluxes at a heat a little above that of boiling water, and lead at a dull red heat, and the tendency is to make the glaze blister and rise up in small bubbles, making the face of the brick look like a ginger grater. When the materials for the glaze are weighed out they should be put into a mill and ground in water, and the grinding should continue until the materials are reduced so fine that when taken between the thumb and finger there is no roughness or gritty feeling, and when sufficiently ground, should be run through a No. 14 silk lawn sieve into wood or earthenware vessels, and should stand at least a fortnight before being used, and should be stirred up once or twice every day. The reason for this, is, that all glazes ferment when newly mixed and are full of air bubbles, and, if used in this state, will lick up on the face of the brick when it is dipped; as the glaze dries these will burst and leave small holes, which are called pin-holes; these will be in when the goods are burned and render the bricks worthless for the market. You might think that when the glaze fluxed, it would run and fill up the small holes—a common earthenware glaze would do this, but this glaze is altogether another thing. A brick glaze is a dead flux; it will not run or flow, or in any way spread itself, and, therefore, whatever defects there is in it before it goes to the kiln will be in it when it comes out. If lead is used to soften the glaze to make it run over these holes, there will be brought into operation at least three other evils, (1) it will run to a thick web at the lower end of the brick, (2) it will be a yellowish color—not white, as it should be, (3) when it comes from the kiln to the air it will “go crazy,” that is, it will crack all over, resembling very much a spider's web; and if it gets a hard fire it will blister. All these things should be avoided.

ENAMEL.

Enamel is the next important matter. Potters clay, or what is known as fine ware shavings, is used as a rule for the enamel, but this should never be done for several reasons. Some enameled ware manufacturers stain their bodies, or clay, and if this be used, the bricks will be a bluish color; others put no stain in the clay but put it in the glaze, and if this should be used the bricks will be a cream color.

Your readers must know that enam-

eled ware manufacturers stain the clay or the glaze, as the case may be, to take out this creamy color. This is quite right for this class of goods, but it will not do for bricks, as they must be white if they are to stand in the front rank, and it would be sheer folly for any one to set up a lower standard of excellence than the highest. For it will cost as much in every way to make an inferior brick as it will to make the very best, while the former class will only bring, at the most, two-thirds of the price of the best. Then again, no two potters mix their clay the same, and, therefore, the shrinkages cannot be the same, and much trouble, and, in many cases, failure may and very often does arise from this cause. The proper and safe thing to do is to mix or make the enamel in the same way as the glaze is mixed and this can be done from the materials, a list of which I have given, and so varied as to suit any clay, no matter what the shrinkage may be, always bearing in mind it must be a fire clay or a clay that will stand a sufficiently high temperature to flux the glaze suitable for an enameled brick; and the enamel like the glaze should stand at least a fortnight before it is used. Then there must be perfect cleanliness observed. There should be a place in which to keep and mix all the materials with, the vessels and sieves, sponges, etc. This place should be handy to the work shop, but separate from it. No speck of brick dust or any dirt should be allowed to get into it. All vessels, sieves, and everything connected with it, when used should be well washed in clean water, and every precaution taken to secure the very best results.

I must now leave the matter for the present, as I am afraid I may be taking too much of your valuable space, but allow me to urge upon your readers to be satisfied with nothing less than the best. Set the standard high. Let it be the best first and the best always. This will pay. Anything less than this is not worth following.

MANAGER.

Likes the Continuous Kiln.

Editor Clay-Worker:

It will no doubt be of interest to some of your many readers to hear something of what we are doing in brick burning. We had Mr. Wm. Radford of Sioux City, Iowa, build one of his continuous kilns this spring, 14 chambers, each chamber holding 32,000 brick. We have, so far, burned 7 chambers and have

now two opened, finding the brick all hard burned, and none broken. There is a great saving over the old method of burning as the cheapest coal is used for fuel, and the long and tedious work of tossing in setting, casing up, plastering and removing casing again is all done away with, besides having a product free from salmon brick and bats. I believe that Mr. Radford's is the cheapest continuous kiln to build and is by far the strongest.

J. G. HAMMER.

Butte City, Mont.

New York and Vicinity.

Editor Clay-Worker:

I enclose check in full for the CLAY-WORKER to December, 1891. I am sorry that you have not been paid from year to year and I shall see that you get your yearly subscription from this time on, as I enjoy your CLAY-WORKER very much, especially the New York State news.

In reply to your query as to the outlook in this vicinity, would say, that it is pretty "bluc," as you know we are having a number of strikes in different branches of the building trades in New York City and the lumber men have been annoyed considerably, all of which has, with the great amount of bricks going into the New York market caused the price of bricks to be anywhere from \$5.00 to \$6.00 and possibly only two or three manufacturers that have been able to get \$6.00; for the last two months the prevailing price having been about \$5.50 for good hard brick from Hackensack, and possibly a quarter better for Haverstraws. And we have had some labor troubles here and at Haverstraw. At the latter place there was a general cut down of five dollars per month, and in two cases where the cut down was made on the evening of the pay day that the men were informed of the reduction, before midnight three barns were burned to the ground and several valuable horses burned up, which was without doubt the work of the men employed by the brickmakers. The first fire was at Grassy Point and were the barns of Washburn, Fowler & Co., and the next two were on the yard of M. F. and L. Washburn, where the four horses were burned up and the last fire was at the yard of the Archer Bros., burning barn and contents to the ground, under the same circumstances exactly, as they had informed their men that they would have to reduce their wages \$5.00 per month, from the foreman down to the machine boy, and here at Hackensack the Mehrhoff Bros.

Brick Mfg. Co. have had some trouble with their men, as they notified their men they would have to reduce their wages \$5.00 per month and the men struck, and I understand that Mr. Mehrhoff paid them off immediately and gave each man a good cigar and told them he could better afford to do that with them than pay the present wages and sell brick for the prices that now maintain, and I agree with him, although I have not cut my men down as yet, as I am in a neighborhood where the manufacturers think that reducing the wages is not the proper course to pursue, as they claim reduce the production and that will regulate our business and I am of the same opinion. We have got to make less brick here in the locality or some of us will soon make none, as at the present prices they are certainly not better than cost and the manufacturer has got to make his bricks under the most favorable circumstances, such as no mortgage or note and everything the most favorable or he cannot ship them to New York at the present prices and quit even.

AN OLD SUBSCRIBER.

Philadelphia News.

Editor Clay-Worker:

Although we have had one of the driest Mays on record, building operations have not commenced to any extent, and bricklayers and brickmakers who think they have the gift of looking into the business future, are of the opinion that it will continue dull during the summer.

The principal business to be done in the brick line will be with the vitrified brick. There has been a great deal of agitation over this class of brick in the Highway Committee of Council, where the contention has arisen over the desire of one or two of the Committee to place every obstacle in the way. About the only vitrified brick which has stood the test for a period of two years is the West Virginia, and where it is put down in West Philadelphia it is just as good as the day it was laid. A pavement which a contractor cannot guarantee for more than three years ought not to be laid anywhere, and this is what the West Virginia people propose to do.

In the opinion of some of our experienced contractors vitrified brick is the best, simply because it is harder, more compact, and will stand the wear and tear as no other brick will. If a brick pavement of good hard material is laid properly, it will not only make the most handsome street, but if properly laid it

will outstand anything yet adopted. In Frankford the property owners met to organize in opposition to paving with asphalt and Belgium blocks as recently passed by Council. The fact of the matter is that the people who once see the vitrified brick pavement will have no other, and this is the case with these Frankford people.

The Trenton potters are again at work after a strike which lasted but a short time. It is said that the matter was fixed up through compromise.

The parties who bought the Clifton (Delaware Co.) Brick Works, have been incorporated under the title of the Clifton Steam Brick Works.

To sum up, the brick manufacturing business is very dull. The Jarden Company, who are generally in the lead, have shut down one-half of their yard, and are only making 60,000 bricks daily; they are also making some few ornaments.

A QUAKER.

Buckeyes.

Editor Clay-Worker:

The yards in this locality are all busy, bricks are scarce and hard to get, but this will not be the condition for long; the daily out-put is large, and in a few days all yards will be able to supply—in part—the demand for bricks. We say "in part" for truly judging by present indications the demand will far exceed the supply, so that long before another season opens there will not be any bricks obtainable. On every hand new buildings, requiring more or less brick in their construction, are going up. If we take up any of our city papers, we find that a goodly number of building permits are daily taken out.

In addition to all the buildings going up, there are many sewers going down which makes the demand for bricks more urgent. The city is growing very fast, but not booming, its growth is healthy; and as the city grows, so also does the business of brickmaking.

We have no accidents to report, no one was hurt in any way. We have it on the best of authority that some of the racks on the yard of E. B. Hall went down with 30,000 bricks, the loss was not as great as it might have been. On the East Side the same trouble occurred. Part of the racks on the new Buckeye yard went down, the loss in this case was about 20,000 green bricks the dry bricks escaped with very little injury. The greatest loss was the time taken in straightening up again. At the yards of

the Findlay Hydraulic Press Brick Co., they are having some trouble with the clay, it is exceedingly strong and sticky making it hard to dump. It is to be hoped that the company will be able to overcome this difficulty. This company is putting in Natural Gas for fuel. The Buckeye Co., also, will use the same kind of fuel. This company, with commendable enterprise put down a line of nearly 2,000 feet in order to obtain their gas supply. The gas was used under their boiler on Decoration day for the first time. On this yard a kiln will be fired in a day or two. At the Howell Yard two kilns have been burned and a third one is nearly ready for firing.

The Collingwood Co., have fired their first kiln, here wood and coal is the fuel used. This Co., put in a sanding machine this spring, but it was thrown out last week, it would not work, a man with the old-fashioned sand box is doing the work. More might be written, but, Mr. Editor that awful waste basket looms up too prominently. More s'mother time.

TOLEDO, O.

PLYMOUTH.

A Familiar Voice.

Editor Clay-Worker:

Why, oh why, Brother Gates, wilt thou make Rome howl again? Are not the brethren sufficiently afflicted already? The backward spring, bricks ruined by frost and rain and floods, machinery breaking, roads muddy, collections slow, the money borrowed to pay expenses to the Convention last winter is due and no money in the exchequer! Is not this quite enough without a howl from the eternal city, so beautifully and graphically pictured by my esteemed contemporary from Chenoa, Ill., honorary member of the "Gum Stick 'um Club," of Indianapolis. May his raven locks never turn gray, or become less numerous. I lay the responsibility of this calamity at your ample feet.

By the way, I am preparing a lecture to be delivered frequently, in the near future, entitled "Footprints of Gates in Rome, and How He Got There."

I would have howled sooner but have been busy making bricks and protecting them from the voracity of those goats. Rome goats are peculiar in their tastes. They will, when quite hungry, dine off a terra cotta man, although they prefer brickbats, as they are more digestible.

I am informed that the hungry brother only escaped a herd of our goats by taking refuge under that hat. By the way, I see by his picture, that adorns the head

of his articles in the CLAY-WORKER, (they are good pictures, too, only he looks a little thinner and more hungry), that he still wears that magnificent Memphis trophy. By next winter he will be ready to inveigle some guileless brother into trading.

I met friend Dyas, of Nashville, the other day, we were exchanging experiences, when he asked me what kind of a fellow Gates was, anyhow? I told him he was not to be judged by surface indications. He seemed relieved at this information, for said he, "Mr. Gates has such winning ways." Friend Dyas, like Brother Gates, is threatened with corpulency.

Ever since the Convention was held last winter, I have been wanting to express my thanks to the Indianapolis brickmakers and citizens, generally, for their royal reception and tireless attention while we were there. I was proud of the grand Hoosier capital, one of the most beautiful cities in our country. Its hospitality was recognized by the Convention electing as their president the most popular man in the State and a resident of that city; also by choosing another citizen as their corresponding secretary, not because of his handsome face but for invaluable services rendered the craft in the past eight years. Bro. Fletcher only escaped an office, for the reason that he was so busy looking after the comfort and pleasure of the visiting ladies he had no time to look after his political "fences."

The writer was right at home in the capital city; met so many old friends and kinfolks that it interfered seriously with my attendance upon the sessions of the Convention. This, however, was my loss and not that of the Association. One great disappointment awaited us all—the absence of friend McCain, of Denver; his place it is impossible to fill, for there has been but one, and there will never be another John McCain. I was pleased to see his letter in May CLAY-WORKER, and that he sympathizes with us in our controversy with the distinguished traveler.

I almost forgot to call attention to Gates' reference to our city. He says he got to the Gulf by rail without passing through Rome, therefore, all roads do not lead to Rome—but one end, however, comes here, the other leads to innocuous desuetude, and Gates took the other end of the road and missed us. He tells us, regretfully, that he was compelled to

take water at Nashville, that it caused such a shock to his nervous system, that he gave his customers ten hundred pieces of terra cotta for a thousand until he returned to his normal condition.

Yes, he passed by us on the other side, but there is always some consolation as well as compensation, for meal is twenty-five cents a peck and bacon ten cents a pound—result, a new summer suit.

I intended to mention other leading and useful members of our Association but just can't do it this trip. I always thought if any one man could set the world on fire, it was friend D. V. Purington—I put it D. V. as Charlie and Will are becoming pretty well and favorably known, and if I had said Purington some one might inquire which one I meant—but I did not expect that he would do it by "kicking red hot bricks into new buildings." I have great faith in the success of the World's Fair, for I know Bros. Purington, Weckler, Alsip, Moulding, and others of our craft are there, and will do worse than kick hot bricks into buildings, if necessary to the success of the great Fair. Georgia will be there in great shape, as well as all the other Southern States. So brace up, brethren, for the great occasion.

To all my friends, let me say: Come South, and see fine climate. We have it by the front foot, square yard or acre—the cotton and the cane, and the gay and festive Georgia melon in all its juiciness, and when you are weary of enchanting landscapes, come and see

ROME A-N-D-I-(E).

Washed Ashore.

Editor Clay Worker:

The leading Trans-Atlantic steamship lines are building each year new vessels for "Record Breakers."

The brick manufacturers looked forward to the month of May with two very distinct feelings, one of which was that the "Record" of low prices and slow demand would be improved, the other was that the squally weather of labor troubles that generally take place in May would pass over. Well, the record is "Broken" and with a vengeance, but it is for lower prices. The squall struck and has knocked things endways. The good ship "Brick" is lee rail under, with the smallest amount of production possible. The "Captain" constantly on the bridge trying to work her over to the windward in smoother water. Before he reaches the desired haven he has to pass that large shoal "Lumber Boycott," also a

very large "Sand Bar," reduced number of permits for building for the first quarter of the year, which is always the largest. By some oversight on the part of the mail, I am not able to give you the figures for New York City at this time. You will see that even Brooklyn has broken the record this year.

First quarter of 1890, No. of new buildings 1,216, cost \$6,053,701. Alterations, No. of buildings 315, cost \$357,960.

First quarter of 1891, No. of new buildings 1,045, cost \$4,824,230. Alterations, No. of buildings 261, cost \$392,930.

Quite a falling off.

It may not be known to your many readers that Brooklyn is the "Pale Brick" consumer, as the building law of New York City will not allow the use of them, as result the demand for pale has fallen off and is very low.

If one of our Western and Southern brethren could spare the time to visit the New York brick market at the foot of West 30th Street, they would see a collection of brick that would surprise them. At present there is about twenty-five barges laying there every day, with cargoes of brick varying in size, but not less than 250,000 each.

If some of the manufacturers at your large centers of production can inform our manufactuaers how they can improve the following prices the information will be thankfully received.

Haverstraw, \$4.75, 5.74 and \$6.00, according to quality.

Hackensack, \$4.00 and \$5.00, according to quality.

Up-Rivers, \$3.50 and \$5.25, according to quality.

Fishkills, \$5.00 and 5.500, according to quality.

Washed, \$3.75, \$4.00 and \$5.00, according to quality.

Pale, \$2.00 and \$2.50, according to quality.

Lower, or South Jersey will not bring \$5.00 per thousand.

The prices quoted are the prices asked and in most cases is above the selling price. I think I hear some of your readers say "Imposiible," but the prices remain nevertheless.

The yards at this place are running very slow, some only running one machine a day of 21,000. The four machine yards run but two machines a day. One or two of the yards are shipping last season's brick. Only two of the yards have burned their first kiln of brick this year. Unless there is a change very soon the season for manufacturing brick

will be short. Harvest time comes in August. Probably the brick harvest will come at that time. We live in hopes, if we have no World's Fair to help us.

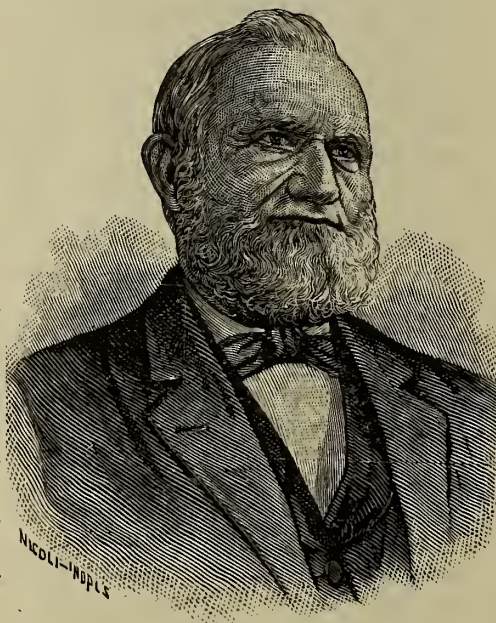
A. N. OLTIMER.

Hackensack, N. J.

Tests of Paving Brick.

Editor Clay-Worker:

I manufacture vitrified paving brick. So far they are all taken as fast as made, in this locality, and I have no occasion to advertise them. Several well informed persons, however, have pronounced them the best they have ever seen; and I wish there were some means provided whereby we might procure authoritative tests, with certified reports of results. My suggestion is that in your



J. W. CRARY, SR., BLUFF SPRINGS, FLA.

city, (which seems to be the headquarters of brick), some person would provide the necessary apparatus and undertake for proper fees, to scientifically test paving material, and especially brick. I should be glad to patronize the concern.

It seems to me that my vitrified brick, not only will outlast granite because it can be laid so much more smoothly and closer, but that it is harder than granite, or will wear less even under equality of circumstances. And I could wish *pro bono publico*, and for the honor of the art, as well as for my own credit, that there were some way to find out the fact.

VITRIFIER.

[Prof. Ira O. Baker, of Champaign, Ill., author of "Durability of Brick Pavements," is prepared to make such tests. —Ed.]

THE LAND OF FLOWERS.

It was our pleasure recently to stop off between trains at Bluff Springs, Fla., and make the acquaintance of our worthy contributor, J. W. Crary, Sr., whose face looks up from this page. Going to the brickyard, but a short distance from the station, we found Mr. Crary, who is now nearly eighty years of age, looking after the work carefully. This, we presume, is the result of habit, for the yard is really in charge of Mr. J. W. Crary, Jr., who has graduated from the Crary school of brickmaking and is eminently qualified to assume control of works many times larger.

The demand for brick in their immediate locality is rather limited, so they have to ship most of their brick to distant markets.

They make about 15,000 a day, using a Penfield plunger machine. Considering the character of the clay, which is quite sandy, they make a very good quality of common brick. The clay is mined some two hundred feet or more from the works and hauled in dump cars, from which it goes into a Potts Disintegrator and thence to machine. Mr. Crary spoke very highly of the Disintegrator, which he says thoroughly mixes and pulverizes the clay, putting it in the very best condition for the machine. The brick are dried in the open air and burned in common clamp kilns, with wood, by the Crary method, which has been fully described by him in former issues of the CLAY-WORKER, and in his able work entitled "Brick-making and Burning," which is a summary of his life's experience in the business.

Mr. Crary is a Northern man but has lived in the South so long that he is considered a native by his neighbors, few of whom have been so long identified with that section. He is a remarkably vigorous old gentleman—a living example of the benefits of a rugged outdoor life upon a brickyard.

Frank McAvoy, of Philadelphia, writes that the Sand Grinder, cut of which appears on page 646, is rapidly gaining favor wherever given a trial. This is not surprising in the least, for it is an admirable machine, simple and durable, and performs its work perfectly. No brickyard using sand for molding, or other purposes, is complete without this machine. If you use sand, write to Mr. McAvoy for descriptive circular.

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ON AND UP.

The largest tax which this nation pays is the fire tax. This is brought about through great indifference to matters of construction. There is a reason for this indifference. There is a definite relation between the national rate of interest and the national character of building construction. In foreign countries where the rate of interest is low, building construction is of a high character. We are coming to the same thing in America. As the rate of interest becomes lower the character of building will be better. It will take us some time to become convinced that we cannot get a return from a poorly built structure. But in time this will be realized and we will do better work. This necessity has made itself felt in many parts of the country. Thus far the efforts to good building construction have redounded to the advantage of clayworkers, and in order to ride in on the crest, all should be ready to encourage further advancement in this direction.

ORNAMENTAL BRICKWORK.

In France the country house, or the one which would compare to the suburban or detached city residence in America, is a very substantial affair. In the vicinity of Paris one sees many beautiful brick cottages. The people of that section have the faculty of handling colored brick successfully. It is not uncommon to see red and yellow and black brick used in bands and decoration picked out in blues and greens, the lat-

ter being in tiles. An American architect would be almost certain to make a failure of work of this kind. It would be called brilliant, flashy, ginger bread, and what not. But with a nation of their artistic instinct and education these combinations in color are handled without giving offense even to the quieter taste of an American. It is a pleasure to notice the character of the general construction of these buildings. The constructive details are of the best character possible. Instead of the wood "flimflams" in the gables, so common with us, theirs are formed with clay products. The principal decorative rafter in front of the gable is covered and protected with tile of a decorative character and all arranged and secured in a way to make them practically everlasting. No matter how brilliant this architecture, it is always of a high order of stability and will stand for ages without appreciable repairs. If we were to use tile wall covering where we now have shingles, tile gable decoration, tile roof covering, we would be emulating a very worthy example. We would be converting cheap, flimsy frame houses into permanent structures, thus doing away with the necessity for paint and would generally reduce the repair account on this class of building.

AMERICAN ARCHITECTURE.

The great improvements which have been made in building construction in America have come largely through the agency of clayworkers. Experience has shown that iron columns or stone supports without the protection of clay are useless in case of heavy fire. The logical outcome of such a suggestion is the use of clay to protect iron or stone as a structural material. Clay was used first in its burned forms for filling between beams, afterwards to surround columns, finally as building blocks for fronts, now for partitions and flues and in the larger and more important structures the clay products form a shell and screen for the structural parts rather than the frame and body of the structure as was the original method. In the best buildings which we have to-day in America the frame is of iron throughout, of a character that will stand alone without depending upon the wall of internal fillings. The frame gives the stability and the general form. The clay work covers the frame, divides the structure and protects the interior and the structural parts from the elements. This is a new

order of architecture, a new style of construction—the American style. We have asked ourselves many times: "Have we an American style of architecture?" We are nearer to it now in this style of construction than we have been.

BRICK ROADWAYS.

At Decatur, Ill., the other day, we observed that the brick paving that had been in use for six years, in front of the Brunswick Hotel and Grand Opera House, when taken up to lay the track for an electric line of cars, showed but little wear—none to speak of. This is one of the principal streets of the city, and the excellent condition of the pavement was very assuring, indeed, of the future of brick paving.

In company with Mr. J. G. Shea, we drove over a number of streets which have been paved with brick for from one to six years, and the wear—if it can be called wear—on some of them is hardly perceptible.

Our attention was directed to one street where the paving material was poor when laid and the work not well done; here there was an unevenness and wear to be expected. But this example only served to enforce the need of selecting good material.

The asphalt men are offering to pave one of the streets in Decatur under a five year guarantee and do the work on stone foundation, in best manner, for \$2.25 per square yard. If they were as liberal in their bidding in this city (Indianapolis) it would be a great relief to the property holders and city treasury. But hear they have the ear of the city engineer and "City Dads."

However, the cue to their bid at Decatur, is, that they may publish it to the world that they have discarded brick, where they have been used so long and turned to asphalt, and refer to Decatur to prove their statement.

If the manufacturers of paving brick used as much money and printer's ink to introduce brick paving as the asphalt companies do to boom asphalt, the demand for brick pavers would be doubled in a short time. As it is, the merits of brick paving does the work of its own introduction.

Brick paving does not require that it should be kept dry and clean for its best preservation. The continued moisture of a hundred years will not injure a good paving brick. After good pavers are laid there is no running around with pick axes to dig up the failing spots, and

boiling pots of solution to make necessary repairs.

Whether clean or unclean, used or unused, good brick pavers, well laid, are as enduring as the Rock of Ages.

IN AND ABOUT NEW ORLEANS.

It was our good fortune recently, to pay a hasty visit to the Crescent City and to enjoy the hospitality of our good friend, J. A. Blaffer, who will be remembered pleasantly by the charter members of the National Brick Manufacturers' Association as the first Vice-President of that organization. It was our first visit to this great Southern city and we were prepared to see many queer quaint things, and was not disappointed. We found the old French quarter fully as ancient and foreign as our friends who've "been there before" had pictured it, but was very much surprised and charmed by the beauty of the modern or resident portion of the city, which is rich in everything that goes to make home life pleasant. The dwellings are uniformly large and airy, and, without exception almost, are surrounded by beautiful flower gardens, where tropical plants, that we in the North only know as hot house plants, grow and blossom luxuriantly.

For climatic reasons, nearly all resident buildings are constructed of wood, hence the demand for brick is comparatively small for so large a city. The present annual consumption amounts to but little more than 25 million brick, which are made by the old hand process, or by soft clay machinery, which is the nearest approach to that method.

J. A. BLAFFER & SON'S BRICKYARD.

Mr. Blaffer was the first, we believe, to make brick there by machinery. He is now running a "Quaker," turning out 25 thousand or more a day. He erected a Sharer Dryer several years ago and has used it successfully ever since. Its daily capacity though is only 6,000 and the balance of the brick are dried by the rack and pallet system. They burn with wood, coal and coke in about 12 to 14 days from start to finish and produce a very good grade of common red brick, though they are a little light in color. It is Mr. Blaffer's intention to make repressed brick in the near future, in fact he has already purchased a Raymond Press and is anxious to secure a molcing sand that will burn a dark red, hoping in that way to improve the color of the brick.

Mr. Blaffer and his neighbor brick-

makers have one advantage over fellow craftsmen generally—there is no danger of the clay giving out. A fresh supply is brought to them every year by the Mississippi. During high water the clay is deposited in a low place where there is little current, about which a levee is formed, then during June and July, when the river is down, or at its lowest, this deposit, which is six feet or more in depth, is dug and wheeled out to a place of safety, near the brickworks, from which it is again wheeled to the machine as it is needed.

A NEW VENTURE.

In company with Mr. Blaffer, we visited a neighboring yard (Messrs. Frey's Son & Co.'s) and found them just completing the erection of a "Triumph" Dry Press Brick Machine, from the factory of J. J. Kulage, St. Louis, Mo. If we may judge from appearances the machine will prove successful for it has evidently been erected carefully by experienced hands. The clay was tested in St. Louis and is thought to be well adapted to the dry press process. This firm has been making brick by hand and the change from that primitive method to the most modern process speaks well for their progressiveness and enterprise.

We next visited the yard of Jacob Von Hoven. All was silent here. It was Monday, and, as is quite frequently the case on hand yards in this section, the hands had not recovered from their Sunday rest sufficiently to enable them to report for duty Monday morning. However, we found the proprietor at his home near by, and was cordially invited in and enjoyed a pleasant chat and a cool refreshing drink. Mr. Von Hoven is getting on in years and hopes to retire from active business life soon and place the burden of managing the brickyard upon younger shoulders.

We are indebted to friend Blaffer and his family for many courtesies, and will not soon forget the kindly hospitality that made our brief visit a very pleasant event.

STARTING RIGHT.

The Brown-Frazier Manufacturing Co., of Portland, Ind., has been merged into the organization of a new company known as the Decatur Leader Manufacturing Co., located at Decatur, Ill. The change is a very gratifying one to all the parties concerned.

A brief visit to Decatur, Ill., enabled us to make some observations as to the outlook of the new company worthy of

mention. The new organization has a cash capital of \$50,000, and, if necessary, this amount can be doubled. The Decatur Tile Co. (so well known) is a large stockholder, together with other wealthy citizens. The ground occupied is a portion of the old plant of the D. T. Co. Within the past three months, or less, large and commodious brick buildings have been erected, and fitted up with necessary machinery and tools.

The works commenced operations the eighth of this month. The new company already have orders on hand sufficient to employ a large force of men from the start.

The Decatur Tile Co. are improving a new plant on grounds near by, on the line of the Wabash Railway. They anticipate a trade for the "Leader" and a full line of Clayworking Machinery, that will not only require all the room of the new building, but, ultimately, the large brick building now occupied in the manufacture of paving brick. The new tile and brick works are to take the place of the old.

In company with J. G. Shea, who is the superintendent of the works, and well-known to the craft, we visited the new brick and tile plant, now in course of construction. The buildings are built of brick and admirably arranged, including a Sharer Dryer with ten tunnels 100 feet in length. The capacity of the Dryer has already been tested and found to be very satisfactory. The flues of the Dryer are connected to a large 65 foot stack.

They have already burned two or three kilns of brick. The kilns are round down or up draft, 26 feet inside, holding 80,000 brick. It goes without saying, that Mr. Shea is utilizing his past experience in the construction and arrangement of the new works.

The Decatur Tile and Brick Co. have been using the "Leader" Brick and Tile Machine for many months past, and were so well pleased with it that they induced the old company to merge itself into the new organization. Both Messrs. Brown and Frazier are the practical operators of the new plant, bringing with them the experienced men employed in the old plant to operate the new. They have, indeed, under the new arrangement, a very flattering outlook.

MENTION THE CLAY-WORKER

When writing to Advertisers

MENTION THE CLAY-WORKER.

EDITORIAL NOTES and CLIPPINGS.

Full oft about our frightened ears
Our airy castles tumble down,
And oft a cruel cross appears
The thing we fondly thought a crown.

Wall Lake, Ia., wants a brickyard.

Bentonville, Ark., wants a tile factory.

D. B. Ball is making brick at Callaway, Neb.

Frederick, Md., is to have a new steam brick plant.

Mr. Jno. Foster is running a brickyard at Du Bois, Pa.

Jas. H. Rodger & Co. will make brick at Bristol, Tenn.

G. A. Shockley will start a brickyard at Story City, Ia.

A large pottery will probably be established at Colfax, Ore.

Frank Genter is going to run brick works at Madison, Ind.

Alliance, Ohio, is putting down brick on her principal streets.

The Belmont Brick & Tile Co., Martin's Ferry, O., has been organized.

A. B. Mayer, Gretna, O., is putting a new tile machine in his factory.

The Mather Brick & Tile Co., is the name of a new company at St. Louis, Minn.

The West Chester Brick & Tile Co. have put in a Henry Martin Stock Brick Machine.

The Bloomfield Kaolin and Phosphate Mining Co., Gainesville, Tenn., has been incorporated.

W. H. Nickels, O. H. Gobble and others, will establish brick works at Duffield, near Bristol, Tenn.

J. A. Price, Scranton, Pa., desires information relative to the manufacture and use of paving brick.

Williamsport, Pa., is discussing the paving question and will in all probability give vitrified brick a trial.

F. Bowman, E. P. Jones and C. R. Kapes are organizing a company to manufacture paving brick near Denver, Col.

The St. Charles Pressed Brick Co., St. Charles, Mo., have put in a New 4 Mold Andrus Press and are highly pleased with it.

Mr. Anthony Ittner's new works at Belleville, Ill., are in operation. He is equipped with the New Andrus 4 Mold Presses.

If you are interested in the latest improved devices for making brick and tile, write to E. M. Freese & Co., Plymouth,

Ohio, for their illustrated catalogue, which will convince you of the many points of superiority by the OHIO Machines, which they manufacture.

Newton & Co., fire brick manufacturer, of Albany, N. Y., has made an assignment to Mary T. Clark. The business will be continued.

The West Springfield Brick & Tile Co., Springfield, Ill., has been incorporated by Henry Dawson, Jno. L. Mason and Ed. Dawson.

W. H. Robinson, Rochester, N. Y., has several acres of very valuable clay land near that city and contemplates establishing brick works.

The Simpson Brick Press Co., Chicago, has been incorporated by P. L. Simpson, J. L. Simpson and W. R. Omohandro. Capital stock \$150,000.

W. G. Hipp, Secretary of the Massillon Stone and Fire Brick Co., says they will erect a new plant there considerably larger than the present one.

Schick & Pratt, Ottumwa, Iowa, contemplate putting up a stiff clay brick plant and are looking for a second-hand brick machine—an "Ohio" preferred.

The Belmont Brick Co., Martin's Ferry, W. Va., are putting in new machinery and have bought a new dryer which contains over three miles of pipe.

If any of our readers desire the services of an experienced terra cotta pattern and mold maker, they are requested to correspond with W. E. Tonkinson, Cloverport, Ky.

The Isabel (Ala.) Land Company have incorporated with paid up capital stock of \$250,000. They have large deposits of kaolin and will probably erect extensive brick works.

It is reported that Mr. Stafford, of Galesburg, Ill., has located a large tract of valuable paving brick clay near Springfield, Ill., and will organize a company to establish works there.

A couple of young men (Thomas & Wilson) recently started in the brick business at Iowa Park, Tex. Their first kiln was a failure and they "skipped out" leaving their creditors in the lurch.

A subscriber writes that the recent fire at Muskegan, Mich., wiped out 19 blocks of buildings in the heart of the city. These will all be rebuilt immediately, thus creating a decided boom in brickmaking there.

Are you thinking of buying a new Brick or Tile Machine? Do you have any difficulty in deciding which one you

will buy? Do you want the best? Then buy an "OHIO" made by E. M. Freese & Co., Plymouth, Ohio, and you will never regret it.

The Decatur Brick & Tile Co. have contracted to pave one of the principal streets in the City of Evansville, Ind., with brick, one mile in length, which will require a million or more of pavers. The freight rate from Decatur to Evansville is \$2.00 per thousand.

R. C. Burton, Secretary of the Townsend Brick & Constructing Co., Zanesville, O., informs us that that company is using molding sand that is very fine, both in texture and color, and are prepared to furnish it in any desired quantities to brickmakers throughout the country. For prices, etc., address them as above.

Messrs. C. & A. Potts & Co., of Indianapolis, have contracted with Mr. C. T. Doxey, of Anderson, for two complete outfits including two Horizontal Brick Machines, Disintegrators, Sanders, Elevators, Trucks, Barrows, Clay cars and winding drums, one 50 H. P. engine and 65 H. P. Boiler, and 300 feet of 3-inch line shaft.

Our readers, especially those musically inclined, will find an unusually interesting "ad." on page 672. It is a very decided and rather novel departure from the common form of "ads." and is but another evidence of Messrs. Freese & Co.'s progressiveness. They are not back numbers but always keep well to the front—a commendable practice.

The Ostrander Fire Brick Co., successor to the Troy (N. Y.) Fire Brick Works, in addition to continuing the manufacture of fire brick in all its branches, intend to establish extensive paving brick works at Ostrander, N. J., where they own valuable clay property. They will be pleased to receive catalogues of machinery, etc., which should be mailed to Ostrander, N. J.

The McLagon Foundry Co., New Haven, Conn., report a very satisfactory trade in brick machinery. Their "New Haven" soft clay brick machine is constantly growing in favor. Those of our readers who are not familiar with it should write them for circulars, giving full description of this remarkable machine and testimonial letters from those who have been operating them the past season.

W. L. Meredith, formerly manager of the Puget Sound Brick, Tile & Terra Cotta Works, located at Seattle, Wash., called at our sanctum recently. Mr.

Meredith says, that since the death of the proprietor, W. C. Hill, the above works have been leased to Wm. A. Trinkle, formerly superintendent, and that the work will be continued as heretofore. More than \$100,000 was spent developing the plant, which has a capacity of 240,000 common brick a day, besides fine facilities for making pressed brick.

Messrs. C. & A. Potts & Co., of this city say that they have had the best trade this season they have ever had, the demand for their Disintegrator having exceeded that of any former season, they having shipped 72 of the No. 2 "A" Machines, and 5 of the No. 4 "A" in the past three months.

Carmichael & Jacobs, of Wellsburg, W. Va., who recently bought clay lands near Wellsburg, have associated with them Messrs. James and Samuel Paul of the Mail City Lantern Co., Wheeling, W. Va., and are arranging to start a terra cotta plant and a dry press brick plant at Wellsburg. The analysis of their clay is the same as the terra cotta clay of Whatcomb, near Torquay, Devonshire, England, which is used in the manufacture of fine art terra cotta.

To accommodate persons desiring to visit the great wheat and corn lands of the West, the Big Four Route (C. C. C. & St. L. Ry.) has established through car lines, equipped with Wagner palace sleeping and reclining chair cars, to St. Louis and Peoria, at which point direct connections are made in Union Depots with through cars for all Western and Pacific Coast points. Now is the time to visit this great and rapidly-growing section of our country, and in order to thoroughly enjoy the trip ask for tickets via the Big Four Route.

The Largest Pallet Yard in Indiana is being erected at Alexander, Ind., by Mr. C. T. Doxey, of Anderson. When this yard is finished it will be the most complete pallet yard in the state. They have purchased two complete outfits of Messrs. C. & A. Potts & Co., of Indianapolis; the yard is 462 x 200 feet and will have a racking capacity of 550,000 brick. The machinery is now on the ground and the rack is now finished. They are building a Gas-well and as soon as this is finished will commence making brick. This yard was designed by and the erection of same is being superintended by Mr. A. Potts of C. & A. Potts & Co., who has had considerable experience in this line, having superintended the erection of several large yards during the past two seasons.

The Muncie Brick Company, of Kansas City, Mo., recently organized, have been incorporated with a capital stock of \$200,000. They will soon begin the manufacture of street paving brick on an extensive scale. The company is composed of men endowed with more than the average amount of good business judgment, and they, realizing that first class machinery is essential to the success of any enterprise of this kind, placed an order with Mess. E. M. Freese & Co., of Plymouth, Ohio, for two of their improved No. 1. Pug Mills, and two "A" Special OHIO Brick Machines, with Board Delivery Brick Cutters.

The Collingwood Brick Co., of Toledo, have their new yard in operation; they are using the Potts Horizontal Stock Brick Machine and Disintegrators working the clay, (which is very hard and tough,) direct from the bank. Mr. Hart, the manager of the works informed the writer when there, that several of the brick manufacturers of Toledo, have visited their yards since starting the machinery, and they all acknowledge that they are making the finest brick ever turned out in Toledo. The Machine is running 9 molds per minute, and they have put 30,000 perfect brick on their yard in 10 hours.

Ambrose Baker of Sandy Creek, according to the *Rome (N. Y.) Sentinel*, has invented a process for making brick, which is likely to revolutionize the making of that article, if all his claims can be proven practical. A sample sent to the School of Mines in New York was tested and approved, being fire-proof and withstanding a pressure of 65 tons. He says there will be no soft brick; that they need no burning or drying, and can be loaded upon wagons for use directly from the machine; and that they can be manufactured cheaper than common brick. In appearance they are like a red sandstone.

Davids & Seabury, of Tallahassee, Fla., write that there is now being organized in that city a joint stock company, consisting mostly of New York and Philadelphia capitalists, for the purpose of manufacturing everything in the clay line, such as tiles, piping, fire and fancy front and ornamental brick, pottery, etc., the company to be capitalized to the amount of \$600,000. They have very fine deposits of clays, and the buff fire clay is pronounced to be of extra quality. In due time this company will require a great deal of clayworking machinery,

but will require each manufacturer to test their clays in each and every instance. They will be pleased to receive catalogues of machinery, etc.

Contractors and builders, and indeed all buyers of sheet metal building material are deeply interested in prompt execution of their specifications. They will, therefore, appreciate this, an example of rapidity, which easily beats the record. Our friends the Cincinnati Corrugating Co., received on March 23rd an order for No. 16 Galvanized Corrugated Arches, which they shipped within 48 hours. The sheets were rolled, annealed, pickled, galvanized, corrugated, curved, and shipped within two days from receipt of the order. Where promptness is desirable we can recommend the Cincinnati Corrugating Co., for they have experience, energy, and unrivalled facilities.

S. K. Fletcher, of Fletcher & Thomas, Indianapolis, Ind., has just returned from a trip through the Southwest, where they have been putting in a great number of brick machines. Mr. Fletcher makes special mention of an interesting visit to the extensive yards of E. N. Weigle, Little Rock, Ark., where one of their new heavy spur geared steam Quaker machines is turning out 45,000 brick every day; also a visit to the yards of the Tennessee Brick & Mfg. Co., Memphis Tenn.—John H. Hensly, Manager—where their daily output is 41,000 most perfect brick; these are two model brickyards in all their appointments, in fact two of the most perfect in every respect in the Southwest. Mr. Fletcher reports their trade for the season up to this time as being beyond his expectation, with the best of prospects ahead.

The National Editorial Association meets in St. Paul Minnesota, on July 14th-17th, 1891. The capital of the North Star State is a delightful place for a summer meeting, and the fraternity has the promise of being handsomely cared for. St. Paul and its neighbor, Minneapolis, are wonderful outgrowths of the marvelous development of the northwest. There are many pretty resorts around these twin giants. The most attractive, perhaps, is Lake Minnetonka, reached via the Great Northern Railway, with four tracks between the two cities, crossing the Mississippi River at Minneapolis on a half million dollar stone arch bridge in full site of the Falls of St. Anthony and the largest flouring mill in the world, and thence through beautiful suburban places to Minnetonka

Beach and Hotel Lafayette, the largest and finest summer resort hostelry in the northwest. The hotel building is over a fifth of a mile in length, and contains nearly five acres of floor surface. Every window faces the lake. All the comforts and accessories known to good living and modern life are provided. It is under the management, for the ninth year, of Eugene Mehl, of the Ryan, of St. Paul.

A community can often learn something valuable about itself from the observations made through the spectacles of an outsider, and if the mental isolation of the South could only admit the justice of some northern criticisms, it would be greatly to the advantage of the South. Mrs. Lillie B. Chace Wyman, deals judiciously but fearlessly with the color question in an article called "A Southern Study," which appears in the *New England Magazine* for June, and her studies are well worth studying by Northern and Southern readers alike. In her paper she brings a strong indictment against the American people, saying that emancipation was not all we owed the negroes; we also owed them a start in life, having deprived generations of their independence, and kept them in dense ignorance and dependence upon their masters. This is very true and it speaks well for the negroes that they have made such progress as we see to-day. As Mrs. Wyman says, the serfs in Russia were treated far better, for upon gaining their freedom they were given some land to begin the world with. The negroes have had to earn every inch of foothold they have got, and in the face of the oppression of invested capital, established prejudices and hatred.

A SAD AFFAIR.

The trouble between the Denver, Col., brick manufacturers and their employes culminated in a most deplorable affray between F. N. Davis and the strikers, resulting in the death of two of the latter, who were shot by Mr. Davis and his son, E. H. Davis. The Davises were on their way to their brickyard with some colored men, who were going to take the place of the strikers, when they were met by a large number of strikers carrying clubs and stones. A fight followed, resulting in the death of two of the strikers and the severe wounding of several others. Great excitement prevailed and for a time it seemed as if a bloody riot would follow, but reason prevailed and further serious trouble was avoided.

Mr. Davis was arrested and charged with murder but was released under heavy bail his neighbor brickmakers going to his relief. It is believed that Mr. Davis and his son will be acquitted, as they acted in self defense. The Denver Brick Manufacturers' Association at a special meeting passed resolutions commending Mr. Davis for his bravery and pledging their united aid and sympathy.

On the other side, the various labor organizations are bitter in their denunciations and will do everything in their power to prove that the killing was not justifiable. Viewed from any standpoint it is a very sad affair. The outlook for the Denver craftsmen is not at all promising.

THE NATIONAL CONSERVATORY OF MUSIC OF AMERICA.

Nos. 126 & 128 East 17th St., New York.

The annual Entrance Examinations of THE NATIONAL CONSERVATORY OF MUSIC, Nos. 126 and 128 East 17th Street, New York, will be held as follows:

Singing: September 24th and 25th, 1891, from 9 a. m. to 12 m.; from 8 to 10 p. m.

Violin, 'Cello, Contrabass, Harp, and all other Orchestral Instruments: September 28th, from 9 a. m. to 12 m., and 2 to 5 p. m.

Piano and Organ: September 29th, 9 a. m. to 12 m., and 2 to 5 p. m.

Orchestra: November 2nd, from 4 to 6 p. m.

Chorus: November 4th, from 8 to 10 p. m.

Operatic Chorus: November 2d, from 8 to 10 p. m.

The object of the National Conservatory of Music being the advancement of Music in the United States through the development of American talent, applications for admission into classes of the Conservatory are hereby invited. It is expected that positive aptitude shall be shown by the candidates for admission, without regard to the applicant's stage of progress, and that his or her desire to receive the instruction imparted in the Conservatory shall be the outcome of a serious and well defined purpose. The successful candidates will enjoy the tuition of the best teachers that can be engaged, and, after graduation, will be afforded opportunities of making known their accomplishments, thus securing engagements. The conditions of admission as to fees, etc., (varying according to the classification of the pupil), are determined by the Board of Directors. Instruction in all branches will be given free to students whose talent and circumstances warrant it. The course embraces tuition in Singing, Operatic and Miscellaneous, Solfeggio, Stage Department, Elocution, Fencing and Italian, Piano, Organ, Harp, Violin, Viola, 'Cello, Flute, Oboe, Clarinet, Bassoon, French Horn,

Cornet, Trombone, Harmony, Counterpoint and Composition, History of Music, Chamber Music, Orchestra and Chorus.

For full particulars, address Charles Inslee Pardee, A. M., Secretary.

NIAGARA FALLS EXCURSION!

Thursday, August 6, 1891. via the Lake Erie & Western R. R.---"Natural Gas Route."

On Thursday, August 6, 1891, the Lake Erie & Western R. R. will run their popular annual excursion to Cleveland, Chautauqua Lake, Buffalo and Niagara Falls at following very low rates, viz.:

Peoria.....\$7.50	Ft. Wayne.....\$5.00
Bloomington.. 7.00	Muncie..... 5.00
La Fayette.... 6.00	Connersville... 5.00
Michigan City 6.00	Rushville..... 5.00
Indianapolis.. 5.00	New Castle.... 5.00
Tipton 5.00	Sandusky..... 4.00
Lima..... 4.00	Fremont..... 5.00
Cambridge City, \$5.00.	

With corresponding reduction from intermediate points.

In addition to the above, the purchasers of these tickets will be given the privilege of special excursion side trips to Lewistown-on-the-Lake, including a steamboat ride on Lake Ontario, for 25 cents. To Toronto and return by Lake from Lewistown, \$1.00; to Thousand Islands, \$5.00. Tickets for the above side trips can be had when purchasing Niagara Falls ticket, or at any time on train.

Besides the above privileges, with that of spending Sunday at the Falls, we will furnish all those who desire a side trip from Brocton Junction to Chautauqua Lake and return FREE OF CHARGE.

Tickets of admission to places of special interest at or near Niagara Falls, but outside the reservation, including toll over the International Bridge to the Canadian side, elevators to the water's edge at Whirlpool Rapids on the Canadian side, will be offered on train at a reduction from prices charged after reaching the Falls.

Do not miss this opportunity to spend Sunday at Niagara Falls. The excursion train will arrive at Niagara Falls 7.00 A. M. Friday, August 7th and will leave the Falls returning Sunday morning, August 9, at 6 o'clock, stopping at Cleveland Sunday afternoon, giving an opportunity to visit the magnificent monument of the late President Garfield, and many other interesting points.

Tickets will be good, however, to return on regular trains leaving the Falls Saturday, August 8, for those not desiring to remain over. Tickets will also be good returning on all regular trains up to and including Tuesday, August 11, 1891. Secure your tickets, also Chair and Sleeping Car Accommodations, early. Those desiring can secure accommodations in these cars while at the Falls. For further information call on any agent Lake Erie & Western R. R., or address C. F. DALY, Gen. Pass. Agent, Indianapolis, Ind.

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Keeping Up With the Times.

The FREY-SHECKLER Co., Bucyrus, Ohio, are enjoying an enormous trade in their large variety of Clay Machinery; nearly three times as large in January and February as during the same months in any preceding year.

The most notable increase is in Dry Pans, Pug Mills and Auger Machines suitable for making Street Pavers.

It is now fully established by numerous trials that first-class pavers can only be made by an Auger Machine. It is also an interesting fact, that over 60 per cent. of all pavers made in the United States are produced by the Frey-Sheckler Co's. Auger Machine.

It puts more clay in a cubic inch than any other method.

It works clay at just the proper temper to make a uniform, homogeneous brick.

All parts liable to break are made of steel. It makes as many brick in a day as can be taken care of. It has with it, as an essential accessory, the Neidergesaess patent lubricating die, which makes smooth surface, square corners, saves power and lamination.

Another new creation that is finding favor with Brick-makers is the new patent cutting table. It is adapted to either side or end cut brick and its capacity fully 20 per cent. above any hand table heretofore used. The column of clay keeps constantly moving, is cut into side or end cut brick whilst in motion, and leaves no fragment to be thrown back into the brick machine.

It is too strong to break and constitutes an important complement to their excellent sets of brick machinery.

The substitution of a short, polished plate with a lubricating roller at each end, for the six or eight rollers that usually carry the column of clay from the die to the cutting table, is also a popular improvement by which the handling and frequent cleaning of the sticky rollers is avoided.

The two rollers really bear none of the burden of the column of clay, but only roll gently on its under side, spreading over its surface a thin coat of crude lubricant which they carry from the oil reservoir in which they run.

The company has several new and improved machines which they will introduce to the fraternity during the summer.

Their clayworking experimental station which they have erected during the past year at Bucyrus, Ohio, at a cost of over \$50,000.00 enables them to thoroughly test their new inventions before sending them to their customers' brickyards.

The interesting 29th Annual Catalogue of the Frey-Sheckler Co., Bucyrus, Ohio, will be sent free upon application.

See ad. on page 669.

THE CLAYWORKER.

VOL. XVI.

INDIANAPOLIS, IND., JULY 15, 1891.

No. 1

Written for the Clay-Worker.

EXAMPLES OF AMERICAN BRICK AND TERRA COTTA WORK.

No. 39.

A TERRA COTTA STATUE.

OUR illustration this month is of a piece of statuary in clay, and shows at a glance what can be done in this branch of art work. Very little has been done in this country as yet in this department of clay work. While great strides have been made in the art of constructive and architectural terra cotta work, statuary in terra cotta is comparatively unknown in America. This is not due to any want of adaptability, for no material is better, if so well, suited to this purpose. It is simply one of our undeveloped fields of clay work. In Europe terra cotta statuary is not at all uncommon, but is used very effectively both for indoor and outdoor decorative purposes and both as reproductions from works of the old masters as well as in new and original studies.

The enduring qualities of terra cotta together with its peculiar and unequalled capacity for art expression renders it especially valuable for sculptural work.

The subject of our illustration is simply a "sketch model," that is, it has not been finished by the sculptor. It is a little more than life size, being six feet in height, and represents an angel blowing the trumpet, calling forth the dead

that shall be raised incorruptible (1 Cor. 15, 52). The statues, four in number, are being made by the Indianapolis Terra Cotta Company from designs by Architect T. L. Dismukes, who was recently called to his last home before the completion of the work. The statues are to be placed on the tower of the Tulip Street Church, Nashville, Tenn. One figure will be placed at each corner,

some ninety feet from the ground, representing the calling forth from the four corners of the earth. The illustration does not do the sculptor justice, as the work, to appear properly at a height of one hundred feet or more, must necessarily appear somewhat crude when photographed almost at touching distance. One of the chief advantages of terra cotta for decorative work is its tractability. It can be produced in almost any color or form.

IT is not what we have, so much, that brings in joy, my dear, as the use we make of it. If that splendid old fellow in the orchestra should use his harp for a fire-screen we would never know what heavenly sounds were in it. But when he sweeps his hands across the chords and brings out those tinkling beats of melody we can imagine how Saul lost his evil spirit when the young David played before him, and over our memory for many days the sweet notes fall again like drops of rain upon the thirsty grass. Life and harps are to be judged by what we get out of and the use we put them to.—*Ex.*

THE great cathedral in the City of Mexico cost, it is said, \$2,000,000. Its roofs are shingled with brick enough to pave a town of 10,000 people. Brick are the shingles of Mexico. They are fastened down with mortar and there is as much masonry on the top of every church and house as there is in its sides.



WORTH WHILE.

It is easy enough to be pleasant
While life flows by like a song,
But the man worth while is the one who will smile
When everything goes dead wrong.
For the test of the heart is trouble,
And it always comes with the years;
And the smile that is worth the praises of earth
Is the smile that shines through tears.

It is easy enough to be prudent
When nothing tempts you to stray,
When without or within no voice of sin
Is luring your soul away.
But it's only a negative virtue
Until it is tried by fire,
And the life that is worth the honor of earth
Is the one that resists desire.

By the cynic, the sad, the fallen,
Who has no strength for the strife,
The world's highway is cumbered to-day;
They make up the items of life.
But the virtue that conquers passion,
And the sorrow that hides in a smile,
It is these that are worth the homage of earth
For we find them but once in a while.

—Ella Wheeler Wilcox.

(Copyrighted.)

DURABILITY OF BRICK PAVEMENTS.

BY IRA. O. BAKER, C. E.

§ 1. Brick is the exclusive paving material employed in many of the smaller cities of the Mississippi Valley, and its use for this purpose is rapidly extending. There are a number of elements which commend brick as a paving material, and the only point about which there is any question is its durability. Several years of actual use in a number of cities have conclusively shown that brick pavements have a considerable durability under light traffic, but there are not a few who still believe that brick is not a suitable material for heavy traffic. The investigations referred to below were begun to fix a standard by which to judge the quality of paving brick, and subsequently the scope of the investigation was extended with a hope of finding a measure of the durability of brick pavements.

The writer is fully aware that these investigations lack very much of being complete, and are in other respects unsatisfactory. He began them nearly two years ago without any expectation of financial returns, and has been able to devote only such fractions of time as he could spare from other more pressing duties. Even after having promised to write up his results for publication, he is reluctant to comply and would not publish this article if there were any immediate prospects of his being able to continue the investigations.

TESTS OF PAVING BRICK.

§ 2. The materials for the following experiments were collected by the writer,

but the larger part of the experiments on the brick were made, under the writer's direction, by one of his students, Mr. J. F. Fisher, as a study for a graduation thesis. Mr. Fisher published an extended account of his experiments in "No. 4, Selected Papers of the Civil Engineer's Club of the University of Illinois." Table I, below presented, is a summary of Mr. Fisher's results, as modified by subsequent experiments made by the writer to test certain anomalous results. The writer has also extended the tables by including other bricks.

bricks experimented upon have been tested by actual service in the pavement, and in every case given entire satisfaction. This phase of the subject is referred to further on in this article.

The second column of Table I shows by whom the samples were selected, those marked B being selected by the writer and those marked M by the maker thereof. The third and fourth columns of the table explain themselves. With one or two unimportant exceptions three or more samples were tested.

TRANSVERSE STRENGTH.

§ 4. The experiments to determine

TABLE I.
SUMMARY OF THE TESTS OF PAVING BRICK.

Ref. No.	Selected by	Locality.	Quality.	Transverse Strength—Modulus of Rupture, in lbs. per square inch.	Absorptive Power, in per cents, of the weight of the dry brick.	Specific Gravity.	Crushing Strength of Cubes in lbs. per square inch.	Loss by Abrasion during 3rd half hour, in per cents, of original weight
1	B	A1	Top course	1,712	4.5	2.10	13,085	0.8
2	B	A2	Bottom course.	1,013	8.5	1.90	6,860	2.6
3	B	B1	Top course	1,496	1.3	2.21	10,545	0.7
4	B	B2	Bottom course.	1,243	5.9	2.08	9,925	2.0
5	B	B3	Old product.....	1,686	4.8	2.11	9,820	2.5
6	M	C	.....	1,680	1.2	2.21	5,260	0.4
7	M	D	.....	1,247	7.1	1.98	5,691	3.0
8	M	E	.....	1,333	2.6	2.12	5,468	1.3
9	M	F	.....	1,790	6.1	2.15	9,494	1.9
10	B	G1	Old product.....	1,187	12.5	1.74	5,185	3.7
11	B	G2	New product...	1,429	4.8	1.87	6,190	.....
12	M	H1	New product...	2,120	3.5	2.24	8,230	1.2
13	M	H2	Old product.....	.....	2.5	2.26	5,890	1.2
14	B	I	.....	1,000	2.0	.....	3,460	0.5

§ 3. Invitations were sent to all the principal makers in all places where it was known that especial attention was given to the manufacture of paving brick, asking them to contribute samples. Not all responded, but samples were received from the following places, viz: Bardolph, Ill., Bloomington, Ill., Charleston, W. Va., Columbus, Ohio, Decatur, Ill., Galesburg, Ill., Sergeant Bluff, Iowa, London Mills, Ill., and Urbana, Ill. This order of arrangement is not given in the tables, the latter being purely accidental. For obvious reasons it would be improper to identify the several lots; but it is interesting to know that the brick tested including samples from the best known makers in Illinois, and from some of the most prominent makers of other States. It is important to notice that, with the possible exception of brick No. 15 (see Tables II and IV), all the

this element were made on a Riehle Brothers' testing machine in the Testing Laboratory of the University of Illinois. The bricks were supported on knife edges 6 inches apart, and the load was applied by another knife edge brought to bear midway between, and parallel to, the other two.

The modulus of rupture was computed by the formula:

$$W = \frac{2 b d^2}{3 l} R,$$

in which W represents the load, in pounds; b , d , and l the breadth, depth and length, respectively, all in inches; and R the modulus of rupture, in pounds per square inch. The bricks when tested were laid flatwise upon two knife edges 6 inches ($= l$) apart. The results of these experiments are given in the fifth column of Table I.

ABSORPTIVE POWER.

§5. To determine the absorptive power, as given in the fourth column of Table I, bricks were used which had lain in a steam heated room from six weeks to six months. The specimen weighed, and immersed in water for about twenty-four hours, then dried by wiping with bibulous paper and weighed. It was found that after twenty-four hours' immersion, the absorption did not increase materially.

Some experiments in testing absorptive power heat the specimen to redness, cool in a desiccator, and then proceed as above. The heating seems unnecessary, since at best absorption experiments can not be very exact. The method employed in these experiments was selected because it was sufficiently exact, was easily carried out, and could be easily duplicated.

SPECIFIC GRAVITY.

§6. The specific gravity was determined by weighing air-dried specimens, immersing them for twenty-four hours, wiping dry, and weighing again.

The specific gravity was then computed by the formula:

$$\text{Specific Gravity} = \frac{W}{W' - W''}$$

in which W equals weight before immersion, W' equals weight after immersion, and W'' equals weight immersed in water.

CRUSHING STRENGTH.

§7. The result for the crushing strength of brick or stone vary greatly with the details of the experiments. In testing stone it is uniform practice to test cubes whose faces are carefully dressed to parallel planes; but there is no settled custom as to the manner of testing brick. (1) Some experimenters test half bricks, while others test whole ones; (2) some grind the pressed surfaces accurately to planes, and some level up the surfaces by putting on a thin coat of plaster of Paris, while others leave them in the rough; and (3) some test the bricks set on end, some on the side, and others lay flatwise.

1. From a series of experiments* on soft bricks, the writer concludes that the crushing strength per square inch of a quarter of a brick is about *half* that of a whole one, a half brick is about *two-thirds*, and *three-quarters* of a brick about *five-sixths*, as strong per square inch as a whole one; or, in other words, the strength of a quarter, a half, and three-quarters of a brick, and a whole one, are

to each other as 3, 4, 5, and 6 respectively. The reason for this difference is apparent if a whole brick be conceived as being made up of a number of cubes placed side by side, in which case it is clear that the interior cubes will be stronger than the exterior ones because of the side support derived from the latter. The important effect of this lateral support is shown by the fact that if pressure be applied to a square inch in the middle of the upper face of a brick, the resistance to crushing will be ten to twenty times greater than if the parts of the brick not directly under pressure were removed, *i. e.*, if the portion under pressure were deprived of its lateral support. The quarter brick and the half brick have less of this lateral support than the whole one, and hence have a correspondingly less crushing strength.

2. The strength of the specimen will vary greatly with the degree of smoothness of its bed surfaces. To determine the difference between reducing the pressed surfaces to a plane and leaving them in the rough, the writer selected six bricks of regular form and apparently of the same strength, and tested three in the rough and the other three after having reduced the pressed surfaces to planes by laying on a coating of plaster of Paris, which, after drying, was ground off to a plane. The amount of plaster remaining on the surfaces was just sufficient to fill up the depressions. Both sets were tested in a hydraulic press between castiron, parallel (self-adjusting), pressing surfaces. The average strength of those that were plastered was 2.06 times the strength of those that were not plastered. Other experiments show that if the pressed surfaces had been ground perfectly flat, the strength would have been increased ten per cent. more.

3. As before stated, some experimenters test brick flatwise, some edgewise, and some endwise. The strength endwise is about half to two-thirds of the strength flatwise; and the strength edgewise is about three-quarters of the strength flatwise.

All the above shows how indefinite it is to say that the crushing strength of brick is so much per square inch, and not give full details as to the manner of obtaining such results. The writer is decidedly of the opinion that as a test of the quality of brick or stone the crushing strength is practically worthless. Possibly there are those who believe that it is necessary to test the crushing

strength to prevent brick which are so soft as to be crushed by the wheels of vehicles from getting into the pavement. Let us see if this is probable. The crushing strength of a cube cut from a good paving brick is, say, 8,000 to 10,000 pounds per square inch, and if the pressure is applied on only a portion of the upper surface the strength is about twice as much. The surface of contact between a wheel having a 1½-inch tire loaded with half a ton is roughly about one square inch, which gives a pressure on the brick of only 1,000 pounds per square inch. Therefore there is no danger of the brick being crushed.

The crushing test was made in these experiments simply and solely out of deference to custom. If the crushing strength could be accurately determined it would be of value in determining the relative strength, and hence would be useful in comparing the quality of different brick.

The results for the crushing strength given in the table were obtained by crushing approximate cubes between self-adjusting parallel cast-iron pressing surfaces, the pressed surfaces of the specimens having been made plane either by grinding on an emery wheel or by laying on a coat of plaster of Paris.

RESISTANCE TO ABRASION AND IMPACT.

§8 The abrasion and impact tests were made by putting the bricks and a number of pieces of iron into a revolving horizontal cylinder. The cylinder was a foundry rattler having wooden staves and iron heads, three feet nine inches long by twenty-six inches in diameter, and revolved at the rate of twenty-four revolutions per minute. The iron used consisted of five hundred and forty-six pieces of smoothly worn 'foundry shot' averaging about one-sixth pounds per piece and having a total weight of eighty-three and one-half pounds.

The writer has seen reports of abrasion experiments in which the brick were "tumbled" with much larger pieces of iron than those used in these experiments. In some cases brake-shoes, weighing anywhere from five to fifteen pounds, have been used, "the loss being determined by weighing the larger pieces of brick." Apparently this indicates that the pieces of iron were so large as to break the brick to pieces.

An abrasion test conducted with large pieces of iron does not fairly represent the conditions in the pavement. In the latter the bricks are supported on all

*Engineering News, Vol. XX1, page 88.

sides except one, and are subjected to pressure and percussion on this side; while in the experiments the bricks are probably broken by blows on the flat side—and possibly this too when the brick is supported only at the ends. In the experiments here reported small pieces of iron were used in the belief that many small pieces more nearly represented the conditions of the street than would a small number of large pieces.

When using large pieces of iron in the rattler, it is customary to tumble the specimen only five or six minutes. Obviously the longer the experiments are continued the more likely will all pieces be worn equally. Hence in these experiments the rattler will run three separate half hours. The average loss for each half hour, in per cents. of the weight of the original bricks, are given in Table II.

stant; and hence the results for the third half hour are suitable for use in making comparisons. Taking an average for all the bricks in Table II, and calling the amount lost during the third half hour unity, then the loss during the second is 1.28 and that during the first 2.24. The values given in the last column of Table I are for the third half hour.

RESISTANCE OF STONE TO ABRASION AND IMPACT.

§9 The above tests for abrasion and impact show only the relative resistance of the brick tested, and give no standard by which to measure the resistance of other brick or stone. To aid in establishing an absolute standard, and also to afford other experimenters an opportunity of comparing the brick of their locality with those tested as above, *i. e.*, with bricks whose durability has been practically demonstrated by long service in the pavement, a number of stones of

Written for the Clay-Worker.
ROOFING TILES.

IN pursuing the subject of tile roofings in its historical aspect we may learn more than mere facts which are connected with the early manufacture of this product. We may learn what study and intelligent consideration did for these people under changed conditions from those of the present, what study and application may do for us. Thought has the same product in all ages; improvement and general advancement.

We indicated in the last number of this journal the development of the Roman tile and its modifications. We now come to the consideration of the tile which originated in a somewhat later period than the Roman tile, but which, however, did not supercede that form of tile in all sections. The Roman tile is in use in some parts of France to-day. However, with its short lap it came into disfavor in the Northern parts of France and in such sections as were subject to snow and freezing weather. Experience told these people that the common form of the Roman tile was not the right thing for a colder section or one where there were drifts of snow. On one hand the snow blew up under the tile

TABLE II.
RESISTANCE OF BRICK TO ABRASION AND IMPACT.

Ref No.	Selected by.	Locality.	Loss in per cents. of the original weight, during			Total Loss during	
			1st half hour.	2nd half hour.	3d half hour.	1st, 2nd and 3d half hours.	2nd and 3d half hours.
1	B	A1	2.0	0.8	0.8	3.6	1.6
2	B	A2	4.9	3.0	2.6	10.5	5.6
3	B	B1	2.1	1.3	0.7	4.1	2.0
4	B	B2	3.6	2.5	2.0	8.1	4.5
5	B	B3	5.0	3.2	2.5	10.7	5.7
6	M	C	0.5	0.3	0.4	1.2	0.7
7	M	D	6.3	3.5	3.0	12.8	6.5
8	M	E	3.1	1.5	1.3	5.9	2.8
9	M	F	4.5	3.1	1.9	9.5	4.0
10	B	G1	5.7	4.1	3.7	13.5	7.8
11	B	G2					
12	M	H1	4.2	2.0	1.2	7.4	3.2
13	M	H2	3.3	1.6	1.2	6.1	2.8
14	B	I	4.5	1.4	0.5	6.4	1.9
15	M	J	2.4	1.0	1.0	4.4	2.0

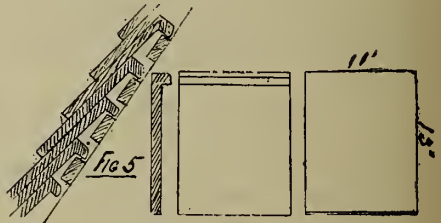
In considering these results it is necessary to remember that the loss will decrease as the corners and edges become rounded, and that the rate of this decrease will vary with the form and hardness of the bricks. Some manufacturers give their paving brick square corners and edges, while some round the edges a little, and a few champher off the edges considerably. Therefore, for purposes of comparison, the results obtained for the first half hour the least valuable. Tests for the fourth, fifth, and sixth half hours show that after the third half hour the loss is nearly con-

well known character and which are widely distributed were tested under exactly the same conditions as were the the brick.

(To be Continued.)

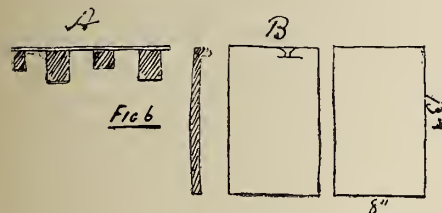
The Difference.

When women fall upon the street they are not filled with ire.
"Did anybody see me?" is the first thing they inquire.
But when a man falls down the chances are that he will mutter
Some hasty, heated words that no good christian ought to utter.



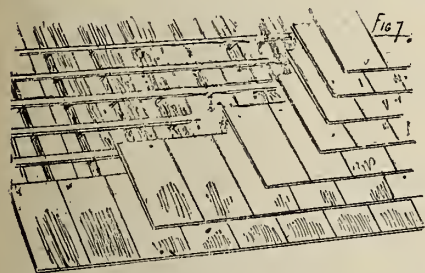
or, again, the water from rain was drawn up by means of the capillary attraction of the dirt and dust under the tile. This froze and if it did not break the tile often caused injury from dripping water. This, naturally enough, called for the lap tile, similar in general design to our shingle tile. That is, it was similar in appearance as it laid on the roof, though quite dissimilar in general form, methods of construction and application. This tile had its origin in the eleventh century and continued in this form until the twelfth. In after years it was subjected to improvements and modifications. On a steep roof it was often laid without nails, though a flat roof it would naturally require other covering than its own weight. It is easy to imagine, however, that the blowing of the wind, would cause quite an annoyance and occasionally some injury to buildings where the tile was employed

in this way. It was, however, the almost universal covering for all structures of that time. I may note in this connection that tile covering in one form or another is the almost universal roof covering, excepting for very flat roofs, in and about Paris at this time. The



old buildings which had the particular forms of tiles which are described in this connection and which originated in the eleventh, twelfth and thirteenth centuries often have the same roofs today that were first put on them. In this city, not far from our apartment, is the tower of an old cathedral built in the eleventh century which has a tile covering similar to the one here described. Strange to say, in the different parts, which have been added to the general structure from time to time up to the last hundred years, the form of roofing has been changed on the different parts. Even where the new roof was built up against the old the design of the new part has been in the style belonging to the time when the change or addition was made.

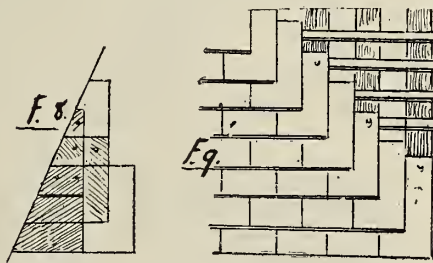
Figure 6 is illustrative of improvements in the construction in the same general style of tile. Figures 6, 7, 8 and 9 are indicative of the methods of application of this tile. It is to be noticed, in the first place, that it was slightly convex, so that each tile could properly lap over the other to make a neater, closer fit. Figure B, which represents the lower



side of one of these tiles, shows the form of the hook, which was altogether much smaller and more ingenious in design than the one shown in Figure 5. "A" indicates the spacing of the rafters. Over the rafter a lath was nailed and the tile laid so that the hook came between the rafter, and the opening for a nail or peg

came on the rafter, which gave it solid nailing space. It is to be noticed in the diagram that the nails were not always on the same sides of the hook. They were on the left hand side in one line and on the right hand side on the other line. This was necessary in order to break joints properly and at the same time locate the hook space and nailing room properly. This is the tile of Champagne, and is quite a famous and satisfactory form of tile.

Figure 8 indicates the manner in which the tiles were cut where they come next to a hip or valley. The tiles were cut in this form while they were in the clay and then burned. It was necessary then, as it would be now, to give the orders for the proper forms before they were needed and then to have them cut and burned. The models for the tiles should be made in wood by the builder and properly numbered and des-

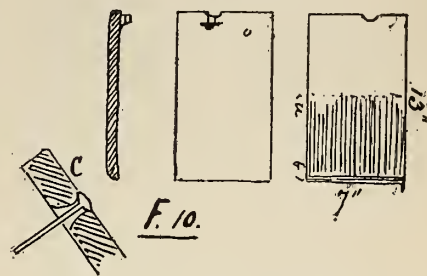


ignated. These tiles in the structural parts of the material are what are known as terra cotta tiles.

Figure 10 shows a tile of the same general design as the other only more carefully made. This came along in the thirteenth century and also originated in Champagne. While it was of the same general design it was more carefully made and studied. It was smaller, thinner, and of better material. Nearly one half of the way up from the buff it was enameled, and when arranged in different colors, red, blue, yellow, black, in a Mosaic pattern on the same roof, it presented a very interesting appearance. The cathedral at Troyes was covered with this tile in a Mosaic of red, black and white. It is interesting to notice how carefully the nail hole was made, so that there was little chance of the tile being broken by movements or other unnatural disturbances.

Figure 11 shows a most beautiful form of hip coping. It was used in connection with this tiling and with hook supports showing on the outside. The Crocket form of decoration is given and one eminently picturesque and beautiful. There is no reason why precisely the

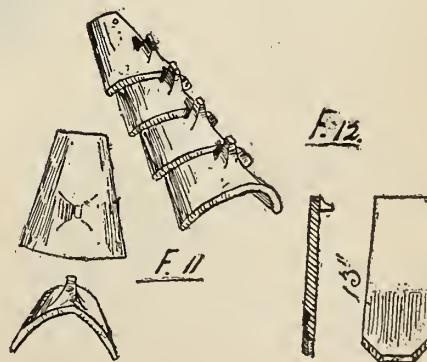
same hip coping should not be used at this time. Certainly nothing more beautiful or picturesque has been devised. The utility of this design, its perma-



nency and general availability, are clearly understood.

Figure 12 is the design used for towers of pointed form. The same as in the hip coping this tile was cut proper sizes before burning, while the clay was soft. Each row of tiling was slightly smaller than the other, so that the joints would be exactly spaced and because of the narrowness of the tile and the projection of the edges, a consequent broken line be not shown. The slight clipping of the corner, as here shown, helps to destroy the uncomfortable effects of a straight tile on a curved surface. Another feature of this tile was the beveled lower edge. Altogether it was a very carefully made and satisfactory covering.

Referring again to Figure 10, it is interesting to notice the little notch which is cut into the upper edge near the lug. This was done so that the tile layer could, by looking at the back of it, tell just what tile to pick up, so as to bring a nail hole directly over the rafter. This little device is one of the qualities which illustrates the care with which these tiles were made. The same form of tile could



be used at this time with the lugs if it were so desired, by nailing strips to the sheathing.

The next article on this subject will bring us into the more modern and more decorative forms of roof covering.

Paris, May, 1891. LOUIS H. GIBSON.

Written for the Clay-Worker.

BRICK AND POLITICAL ECONOMY.

BY J. W. CRARY, SR.

To resume the subject discussed in June No. of CLAY-WORKER, I will repeat that all cost of *Insurance* is directly or indirectly borne and paid by the consumers of products and tenants of houses, and that brick houses, well built, are, in the long run, not only cheaper than wooden or other combustible houses but that the cost of *Insurance* is at least one half less than for wooden houses. At least one hundred millions of dollars would be saved annually in the United States by using brick instead of wood for building purposes and this sum would pay the first extra cost of brick over wood, say nothing of the difference in the real value of brick buildings over wood.

THE FUEL AND HEALTH QUESTION IN BRICK BUILDING

I have had considerable experience in, and given close observation to, heating houses in winter time and I found that well built brick houses were not only heated to a comfortable temperature much easier and cheaper than the best wooden houses, but that they were healthier. The temperature is more equal in a brick house than in a wooden house because the walls of brick are not subject to sudden changes like that of an ordinary wooden house, provided that the walls of the brick houses are built as they should be, with an aperture or hollow space between the inside course of brick and the outside part of the wall, say $\frac{3}{4}$ of an inch wide.

CAN WE AFFORD TO BUY GOOD BRICK TO BUILD COMMON BUILDINGS?

This question is not pertinent in cities where wooden buildings are prohibited, but there are many so-called cities and nearly all the rural places that use wood or other combustible materials almost entirely for building purposes, and the excuse is that brick cannot be had or that they cost too much.

We know that in all the lines of production, both agricultural and mechanical, there are different grades of the same product and these different qualities of things, if genuine of their kind, may well suit the wants and abilities of the people. It is propriety in the use, and proper fitness of things that most

concern sensible people. A person can dress respectably and in good taste for common appearance with a cheap suit of clothes but if it be necessary and proper to appear in special places where certain good kind and style of dress is looked for and required, it would be ridiculous to order and wear a sleazy, shoddy suit. While this view of taste and fitness will apply to a great multiplicity of things, I know of nothing that requires a more strict application of it than the use of brick. A flimsy, *shoddy*, brick wall to make a good job on a good building when substantial, excellent work is necessary, is about the most cunning cheat that can be devised. Look



THAD. S. SMITH, BRICK MANUFACTURER, ST. LOUIS, MO.

for a moment at an average job of brick work in a fine house! All the inside walls are of salmon brick and bats, the outside walls have "headers" and "stretchers" on the outside of hard brick all filled in with *salmon* and *bats*, and these, as a rule, are not half *bonded* or bedded in mortar, and are generally laid dry in poor mortar. The water in the mortar is quickly absorbed by the dry brick and the hardening or crystallization of the mortar is impossible, so that the walls of this fine looking house are only *traps* in disguise. They will not stand wind or fire, or reasonable strain or pressure. Suppose this house cost

\$9,000 and took 200,000 brick for the walls. 70,000 hard brick=\$700; 130,000 *salmon*, *arch* and *bats* @ \$8 per M, \$1040, total \$1740, so that to save \$260 in price of brick the whole expenditure of \$9,000 is in fact worthless. True the damage is an unknown quantity and the house may be rented or sold at a profit, still the house is a sham and a fraud. It is not a good brick house and an honest, competent inspector would condemn it. There will be, unavoidably, a small proportion of *bats* and *salmon* brick however perfect the making, burning and setting may be, and good brickmakers can find sale for their second quality of brick which can be properly used by judicious,

good builders. Hard *bats* and *arch* brick may be used in foundations if well *bedded* and joints *flushed* in good cement or partly cement mortar. *Salmon* brick may be used in chimneys, flues, and furnaces, and in the inside walls of light, cheap houses, but all walls intended for strength and durability, should be built of well burned, hard brick, properly *bonded* and well *bedded* in the best mortar, the brick being well saturated with water just before being laid.

EVERY RURAL NEIGHBORHOOD CAN HAVE A BRICKYARD.

In localities where railroad, or other transportation is impracticable, or too expensive, a little co-operative company can be formed, and after crops are made can always find time to make and burn a sufficient quantity of brick to supply all local needs and wants.

A brick machine, simple in construction, and easy to work, can be had at a small cost, and an expert brick setter and burner can be had, (if there be none in the neighborhood) to complete the manufacture.

The CLAY-WORKER, and the literature it has now to sell, which covers all the ground of theory and practice in brick-making, brings it within the reach and ability of all intelligent, practical men, to become *amateur* brickmakers. About \$8, the average price of 1,000 brick, will get the CLAY-WORKER for one year, and the only two reliable books on the art of brickmaking and burning. Where is the man, whose body is alive, and his head *plumb* and *level*, that cannot afford to know, and if it comes to the *scratch*, make a good brick?

A good eight-room brick house can be built anywhere for the money that a ten-room *frame* or wooden house will cost. The brick house, is in all respects superior, then why not build it? The only answer to this is, from the common, vague notion, that some how or other, a brick is a costly thing—a sort of luxury, exclusive, and an emblem of high style, high life, extravagant, etc. Well, I accept the idea. I believe in *high life*, in *high mindedness*, in *high Americanism*, of the *best make and stock*, with few *salmon heads*, or *bats*, and not a bit of “*foreign trash*.” Let us have good brick, good brick houses, and a good stock of people to live in them. Let us get rid of *shoddy houses*, *shoddy patriots*, *shoddy politicians*, and *shoddy parties*. We have an abundance of the very best material for good brick, and plenty of *good native stock* for the manufacture of good native citizens. Why not supply our needs and wants, and these from the best?

Written for the Clay-Worker.

THE FUEL QUESTION.

No. 9.

GASEOUS FUELS CONTINUED.

DEAR WILL:—In my last, I promised you I would next examine natural gas, and this, although coming last in the series of fuel gases, is without question the best which we are yet acquainted with. Its composition varies almost at every well, and at the same well, almost every day. This variation will be seen in the following analyses, the first is by Mr. S. A. Ford, Analytical Chemist of the Edgar Thomson Steel Works, and published in the *American Manufacturer*. It gives the average composition of natural gas around Pittsburg, Pa. The second and third are of gas from wells at Fredonia, the fourth and fifth are of gas from wells at Speechley, and are taken from “Light, Heat and Power.”

	Av. Pitts.	Fredonia.		Speechley	
Carbonic Acid...	00.60	0.41	0.30	0.05	0.26
Carbonic Oxide.	00.60	0.00	0.00	0.00	0.50
Oxygen	00.80			Trace	0.34
Olefiant gas.....	1.00			0.00	0.30
C ₂ H ₆ Gas.....	5.00	90.05	90.64		
Marsh Gas.....	67.00				
Marsh Gas.....				95.42	92.61
Hydrogen.....	22.00	0.00	0.00	00.02	2.18
Nitrogen	3.00	9.54	9.06	4.51	3.61
Sulphuretted Hydrogen					0.20
	100.00	100.00	100.00	100.00	100.00

Mr. Ford estimates that 1,000 feet of the average Pittsburg natural gas is equal to 54.4 pounds of the average Pittsburg coal, consequently a net ton of this coal is equal to 36,760 feet of the natural gas,

and if the gas is sold at 10 cents per 1,000 feet the coal is worth \$3.67 per net ton, that is, if we take no cognizance of the cleanliness, saving of labor, etc., by the use of the gas, but it would be manifestly unfair from a commercial standpoint to compare the gas and coal from their heating powers alone.

In the Babcock and Wilcox catalogue, entitled “Steam,” they say: “Natural gas varies in quality, but is usually worth two to two and a half times the same weight of coal, or about 30,000 cubic feet are equal to a ton of coal.”

In the early part of 1881 I saw this gas applied to brick burning at New Cumberland, W. Va., and I also saw it used for making lamp black at the same time and place. At Sharpsburg, suburb of Pittsburg, a short distance up the Allegheny River, it was used in a rolling mill generating steam, also generating heat for the puddling and heating furnaces, and had been doing this duty for years previous to my visit in 1881. The well was in Butler County, some 18 miles instant, and the gas conveyed from thence to the mill in 6-inch iron pipes. Natural gas was then in its infancy but was beginning to assert its supremacy. I need trouble you no farther with its history, but confine my remarks to its qualities, etc. I may, however, just remark, that at that period, it was burned in a very wasteful manner, owing to a lack of knowledge as to the quantity of air required to burn it thoroughly.

If you will examine the analyses of it, as given above, you will find that hydrogen is the chief constituent of this gas, and you will remember it requires eight times its own weight of oxygen to burn it; the theoretical quantity of air would therefore be about 27 times its own weight, if we add 50 per cent. to conform with the requirements in practice over 40 times its own weight would be needed to obtain perfect combustion. You will find the gas very free from nitrogen; even the Fredonia gas contains over 90 per cent. of combustible matter, while the Pittsburg and Speechley each contain over 95 per cent.

Hydrogen predominates as to *bulk* in all these analyses, but carbon prevails in *weight* in the Fredonia and Speechley gases, while in the Pittsburg hydrogen rules both in bulk and weight.

In the use of natural gas there is a great deal that can only be learned by practically working with it. Nature supplies this gas generally under very high pressures, while from a few ounces

to two pounds pressure per square inch is ample for all ordinary purposes, and I feel very sure that one-one-hundredth part of the pressure generally used would be ample if the supply pipe and burner were enlarged in proportion to the reduction of pressure. I shall have occasion to refer to natural gas again in my future letters, so for the present will dismiss it, and further consider the thermal unit, or heat unit, whichever you please to call it.

In speaking of the French unit in my last letter, I mentioned the kilogramme as the standard for weight; they sometimes, however, use the gramme instead of the kilogramme; the gramme is only one-thousandth of a kilogramme, but this makes not the slightest difference, for when a gramme of fuel is used, only a gramme of water is heated, or rather each gramme of water heated is the measure of the unit, so that grammes or kilogrammes, pounds or tons, make no difference in the result; the difference in number of units is due to the difference in the degrees of the thermometers. 1° F. being only five-ninths of a degree C. we may therefore convert the thermal units by the same rule as we convert the degrees of the thermometers, thus, if we want to convert the British into French units we simply multiply the units by five-ninths; take for instance, the thermal units of hydrogen, which are 62,032 British, now $62,032 \times \frac{5}{9} = 34,462$. Take again the British units of carbon 14,544 $\times \frac{5}{9} = 8,080$. Multiplying French units by the same fraction inverted reduces the French units to British; $\frac{9}{5} \times 8,080 = 14,544$ and $\frac{9}{5} \times 34,462 = 62,032$. To

people there would be a good deal of needless repetition in this, but remembering how this subject puzzled me, and, how obscure appeared to me the few terse sentences that explained it all, is the only excuse I can offer for this method of making it easy and clear to you; I shall, however, feel quite satisfied you will fully comprehend it by a homely and familiar illustration, and for this purpose let us take a brick kiln with a capacity of 62,000 common red bricks, but which would be equally well filled with 34,000 fire bricks, because the fire bricks are nearly double the size of the red ones; this then represents the British and French units, the small red bricks are British units, and the fire bricks are the French, and 34,462 French units measure the same as 62,032 British units.

SPECIFIC HEAT.

In my last, I cautioned you against the supposition that any other substance might take the place of water in meas-

uring the heat unit, water is for many very good reasons the best substance that could have been fixed on. I showed you that nearly 31 pounds of gold or nearly 18 pounds of silver would be required to measure our present unit, this I told you was owing to the *specific heat* of different substances. If you refer to a dictionary for the word "Specific" you will find "Distinguished one from another," "Comprehended under a kind," "Peculiar," etc. Now these definitions throw little or no light on the subject, for "specific" here does not refer to any peculiarity of the heat itself, but refers more particularly to a quality of the substances that have been subjected to heat; this quality is sometimes called *capacity for heat*, this is not thoroughly satisfactory either, but will serve our purpose for the present, and when once understood, the name is of little significance.

It is found that some substances heat and cool again, much quicker than others; those becoming hot the quickest are said to have the least capacity for heat, or the least specific heat; thus you see from what has been said above that water has over 30 times the capacity for heat that gold has, and nearly 18 times more than silver. From this and what has been stated before it is not difficult to see that the *quantity* of heat that would raise one pound of water from freezing point to boiling point, would be sufficient to easily melt $2\frac{1}{2}$ pounds of gold, 2 pounds of silver or $\frac{1}{4}$ pound cast iron. Now this is owing to the small capacity, or specific heat of these metals. Water you will observe has a large specific heat, or better, a high specific heat, and is the standard by which all other substances are measured. The unit heat of water is represented by unity, or 1.000, which makes that of gold .03244, silver is .05701, cast iron is .1298, brickwork and glass .2000.

Now comes in the application of heat units, specific heat, etc. Knowing that a thermal unit will raise one pound of water 1° F. and of course 212 thermal units will raise one pound 212° or to the boiling point, we can by a very simple calculation tell how many heat units are necessary to raise to any temperature any number of pounds of any substance, the specific heat of which is known to us—let us take for example brickwork, or, bricks, assuming them to be the same.

The specific heat of bricks being .2000, it follows then that one heat unit will heat 5 pounds of bricks 1° F., and calling the weight of a brick 4 pounds it also follows that a thermal unit will heat $1\frac{1}{4}$ bricks 1° , consequently 160,000 thermal units would raise 200,000 bricks 1° . Now $1,700^{\circ}$ is the average melting point of brass, which we will assume is also the temperature necessary to burn a red brick "hard," then $1,700 \times 160,000 = 272,000,000$, these are the thermal units required to raise 200,000 bricks up to the temperature of melting brass, or $1,700^{\circ}$; then, as one pound of carbon, or good coal, contains 14,544 thermal

units, if we divide 272,000,000 by 14,544, we get the number of pounds of coal that will give out this heat, which we find is 18,702 pounds or a little more than $8\frac{1}{2}$ gross tons of coal. This then is the *theoretical quantity* of fuel required to raise 200,000 cold bricks to the temperature of the melting point of brass, and it would unquestionably do it if none of the heat were wasted. This may serve to show how near we are to, or, how distant we are from the goal of perfection; and it may serve also to guard us against the assertions of those who pretend to have considerably exceeded, even perfection.

Tables of specific heat may be found in almost any treatise on chemistry, also in most manuals and hand books for engineers. A very good table is found in the "Pocket Manual for Engineers," by John W. Hill, Cincinnati; it is an extensive table, giving authorities as well.

I must warn you against the conclusion that this kind of knowledge is more ornamental than useful and plays no part in our everyday work and life. Allow me to say that it is so intimately mixed up in our domestic and manufacturing life that it is impossible to ignore it without incurring heavy penalties. Again it is impossible to study properly the nature and qualities of fuels without knowing, or studying simultaneously the laws and properties of heat.

I could give you any amount of examples in specific heat, but prefer, for the present, giving you the specific heats of a few bodies from the work mentioned above, and request you to work them out yourself into examples similar to the one given above, it will do you more good than double the time spent simply in reading:—

Specific Heat.

Hydrogen	3.4046
Water.....	1.0000
Wrought Iron.....	.1098
Cast Iron.....	.1298
Copper.....	.09515
Tin.....	.05695
Zinc.....	.09555
Brass.....	.0939
Lead.....	.0314
Mercury.....	.03332
Gold.....	.03244
Silver.....	.05701
Coal.....	.2411
Coke.....	.2000
Anthracite.....	.2010
Charcoal.....	.2415
Brickwork.....	.2000

From these numbers you must understand that they represent the heat units, or the fraction of a heat unit that will heat one pound of each substance named; for example, one pound of hydrogen requires 3.4046 heat units to heat it 1° F., while gold requires only .03244 of a heat unit to heat it 1° F.

Thus you see while it requires 3.4046 thermal units to raise one pound of hydrogen 1° F. the same quantity of heat would raise 100 pounds of gold to the same temperature. Again, we find that

the fuel that would convert one pint of water from 32° to steam at 212° would raise more than 6 pounds of cast iron to the melting point. This example introduces you to another phase in the study of heat which is known by the name of "LATENT HEAT." This is not a quality in the heat itself any more than specific heat is, but is rather a quality of the substance heated, by which it conceals, or renders insensible to our touch and the thermometer, a quantity of heat which it has received; this is why it is called LATENT heat. Water possesses this property of concealing heat in a remarkable degree. I may also inform you here that water in its different states of ice, water and steam, possesses different specific heats; ice and steam have each about half the specific heat of water; therefore it requires but half the quantity of heat to raise either a pound of ice or steam 1° . Another way of putting this is, that one pound of ice and one pound of steam may both be raised 1° by the same fuel that would raise one pound of water 1° , or, the heat that will raise one pound of water a certain number of degrees will raise two pounds of ice or two pounds of steam through the same number of degrees, (not strictly accurate but near enough).

Now to return to latent heat. If we take one pound of ice that has been cooled down to 20° F. and apply heat to it, 6 heat units will raise it up to 32° or melting point—which we will suppose takes 6 minutes of time, or at the rate of a heat unit per minute—you will find at this point the temperature of the melting ice and water will remain stationary until the ice is melted, and the time required for this melting you will find about 142 minutes; during this time the heat has been applied at the same uniform rate as before the melting commenced, viz., at the rate of one heat unit per minute. Now the ice is all melted, and the water is at 32° , we will continue adding heat at the same rate and we find the water gaining in temperature at the rate of 1° per minute, and, at the end of 3 hours, or 180 minutes, the water registers 212° or boiling point; we keep on adding heat, the water commences to boil but the temperature has again become stationary and remains so until all the water has boiled away, or evaporated, the time consumed in this evaporation we find is 16 hours and 6 minutes or 966 minutes and during all this time we never raised the temperature above 212° . What then has become of the heat? We have applied heat at a uniform rate of one unit per minute for 1,324 minutes and have only succeeded in raising the water from 20° to 212° or 192° . Raising the temperature of the ice from 20° to 32° only consumed 6 units of heat, and raising the water from 32° to 212° consumed 180 units, or 186 units are accounted for in raising temperature, there are, therefore, 1,138 minutes unaccounted for, or, rendered *latent*, we will, however, try to account for them. You will remember that after raising the temperature of the ice from 20° to 32° ,

which consumed only 6 heat units, there was a stoppage of the rise in temperature for about 142 minutes, until the ice was melted, during which time heat was supplied to the ice at the uniform rate of one unit per minute, the ice therefore received 142 heat units, which are concealed or rendered latent by the ice in melting, we therefore call the latent heat of ice 142° , after this the thermometer rises 1° for every unit of heat supplied until 212° is reached and there is then another stoppage of the rise in the thermometer until the water is all evaporated, consuming 966 heat units in the same number of minutes, we therefore say that 966 units are rendered latent in converting water into steam at 212° , or, that the latent heat of steam is 966.

We have then $966+142=1,138$ heat units rendered latent and 186 units of sensible heat, thus accounting for all the heat absorbed by the water for $186+1,138=1,324$. We may state this in another way, viz., that only one-seventh of the heat expended in converting ice at 20° into steam at 212° has produced visible or sensible effect; even the thermometer fails to register more than the one-seventh, as stated, and to all outward appearances six-sevenths of the fuel has been mysteriously wasted. But has it been wasted? No. The one pound of steam we now have at 212° can easily be made to give up its latent in a sensible form so that it can be measured with the thermometer. To prove this we have only to discharge this pound of steam into a certain quantity of cold water and note with a thermometer the number of degrees the water is raised; for example, let us take 5.36 pounds of water at 32° —freezing point—and, incredible as it may appear, the *latent heat alone* of the one pound of steam at 212° will raise these 5.36 pounds of ice cold water to boiling point. Again, let us instead of the 5.36 pounds of water take 3 pounds of ice at 32° ; the steam (one pound at 212°) would melt the ice and then raise the water to 212° . The steam in each case would be converted into water again, but would lose none of its sensible heat, and in the former case we should have 6.36 pounds of water at 212° , and in the latter case 4 pounds of water at 212° . Another example will, I think, be sufficient to awaken your interest in latent heat, and in this example we will render latent all the sensible heat of the pound of steam with the exception of 32° , and all its latent heat as well, without effecting any change of temperature in the substance by which the heat is absorbed; and for this purpose we must take 8 pounds of ice at 32° , or melting point, and let this absorb the heat of one pound of steam; we shall then have 9 pounds of water at 32° . Need I explain these operations? and do you want to know how I got, or, fixed upon the quantities of water and ice to be operated on? I think if I reply to the last question it will explain it all.

First, then, I want a quantity of water

that may be heated up to boiling point by the latent heat of the one pound of steam; this water is at 32° , and one pound of it requires 180 heat units to raise it to boiling point; we have seen that the pound of steam absorbed and rendered latent 966 heat units, it is very easy to see then that if I divide 966 by 180 the dividend will be $5.366+$. I may here remark that the sensible heat remains intact, until the 966° are given up and the steam is gradually condensing while the latent heat is being absorbed. In the second example we operate on the 3 pounds of ice. Now we have seen above that each pound of ice requires 142° of heat to melt it, and then 180° more to raise it to the boiling point— 212° —or, in all 322° , and dividing 966 by 322 equals 3. I have chosen these quantities and temperatures to make the examples as interesting and striking as possible, and to show you latent heat being absorbed in the first instance, and reappearing as sensible heat, the steam giving it up as such without diminution of its temperature, the only change being condensation. In the third example you will observe I have chosen a quantity and temperature that absorbs or renders latent all the heat of the steam, both sensible and latent, in fact all the heat down to 32° has entirely vanished, and now, instead of 8 pounds of ice at 32° and one pound of steam at 212° containing also 966° of latent heat we have 9 pounds of water at 32° . Now the ice, as before stated, requires 142° to melt one pound and the pound of steam contains $212^{\circ}+966^{\circ}=1,178^{\circ}$ from which we must subtract 32° , leaving 1,146 to be divided by 142 equals 8.07, showing the number of pounds of ice at 32° that may be melted without increasing the temperature of the water.

I may remark, in conclusion, that this is no fanciful untried theory, but has been demonstrated in practice and it is this feature that renders steam such an efficient agent in the drying of bricks and lumber; no other agent is capable of distributing heat so equally over large areas and nothing can touch it for uniformity of temperature. Only think of it remaining persistently at 212° with 966° stored up all to be given out before any change in temperature can take place, unless more pressure be added.

Now for a rough and ready proof of what is stated above, take a wooden pail with snug fitting lid, and put in it about $5\frac{1}{2}$ pints of ice cold water, have a hole in the lid for a long stemmed thermometer and another for a small steam pipe, connect your steam pipe with a boiler making dry steam, and blow into the water steam until the thermometer registers 212° , then shut off the steam and set the pail aside for the water to cool, wrap it well up to prevent evaporation, and when the water is cold measure it. If the experiment has been carefully carried out, and dry steam used, the measuring will show about $6\frac{1}{2}$ pints.

Yours paternally,

HYDRO-CARBON.

THE PROBLEM OF BUSINESS.

BY J. F. PLACE.

To sell one's product is the hill of difficulty which confronts every man.

It matters not what that product may be. With the manufacturer it is the article he makes—furniture, pianos, china, lamps and bric-a-brac; boats, machinery, personal apparel, food products, soap, cosmetics and a thousand-and-one other things of necessity, luxury and pleasure; with the merchant it is goods, wares and merchandise; with the lawyer and doctor it is advice; with the schoolmaster experience and knowledge on tap, as it were, and with the editor, clergyman and author it is ability, perceptions, ideas, brains; while with the artisan it is the art of knowing how, and with the laborer, labor. These are all their products or stock in trade, and life is simply a struggle to sell the same—to exchange for salaries and profits, to convert into solid cash. To let the people know what you have to sell is advertising. Every man is advertising when he solicits trade or seeks a position. He offers you what help he has—his products or his goods—and urges you to buy.

The secret of successful advertising is to so favorably impress the customer that he will come to you. If you were alone in the field this would not be so difficult; your wares would advertise themselves in a measure. But you have thousands of wily competitors. Your products—what you have to sell—may be superior to the stock in trade of many of your rivals; but they have advertised, and they and theirs have the reputation, and they prosper while you languish.

Moreover, an article of high reputation commands a greater price. So, also, the lawyer, artisan, editor or doctor who has a reputation for distinguished ability in his profession, commands a higher price for his services. Reputation is simply the good opinion which comes from advertising. The more advertising the greater the reputation, and the more reputation the greater the demand.

Reputation to the lawyer or doctor comes slowly; it is a growth of years. Why? The narrow custom of the profession forbids the open use of the paid columns of the newspaper, and they rely on other methods. That which they take a quarter of a century to accomplish—to obtain notoriety, a reputation—a baking-powder manufacturer will secure by the liberal use of printers' ink in a short twelve months.

The presumption is that there is always merit; there must be, for the people are not fools. But there are a thousand articles of great merit without reputation, and they only need to be brought before the public to be in general demand.—*Printers' Ink.*

BRICKYARD SKETCHES.

The oldest brickyard now in operation about Chicago is that now owned and operated by Thomas Moulding, on the north side. This latter qualification is necessary, as Mr. Moulding is, also, running a yard several miles away in another part of the city. Mr. Moulding is one of Chicago's best known

and therefore predict that for another generation, at least, the brickyard will not pass into strange hands, but will continue under the family name.

The yard is located on a slight elevation and the clay is taken from the bank, which is 12 to 15 feet in depth, to the machine in dump cars, hauled by a wire cable some three hundred feet in

Table was a surprise to us, as indeed we think it would be to many who are familiar with the difficulties usually attending this part of the work, for it does the work perfectly. The clay is very stony, yet the construction and operation of the Cutting Table is such that no trouble is experienced from that source. It is seldom that a wire is broken, and when that does occur it is the work of a moment only to put in a new one. Mr. Moulding commends very highly both the machine and cutting table, which are made by the Wallace Manufacturing Co., of Frankfort, Ind. The brick, which are end-cut, are trucked to an open, or outdoor floor, where they are piled in rows seven high and left till sufficiently dry to go to the kiln. A part of this work is done by women, who, Mr. Moulding says, are more reliable and expert than the men. The brick are burned with coal (some wood being used at the start) in old style clamps in about three days.

Mr. Moulding, also, makes fire-proofing (this department was not in operation at the time of our visit) and wall coping and chimney tops. The latter are molded by hand and burned in small down-draft kilns fired from one side only. At first he had a great deal of trouble in burning the coping, which warped badly, but that difficulty has been overcome,

brickmakers, having taken up the work some thirty ago, he was no novice in the business at that time, for his father was a brickmaker, but was well versed in the art (?) of making brick by hand. He, however, was not wedded to that process, but some years ago discarded it for the more modern and economical machine method, first adopting the soft clay process and afterward supplanting that by the stiff clay.

Though successful from the first, Mr. Moulding, who, we guess, is now near the age of three score years and ten, does not feel that he "knows it all," but is still a student and believes firmly in progressive methods. There is yet much to learn, he thinks, about the seemingly simple matter of making and burning brick.

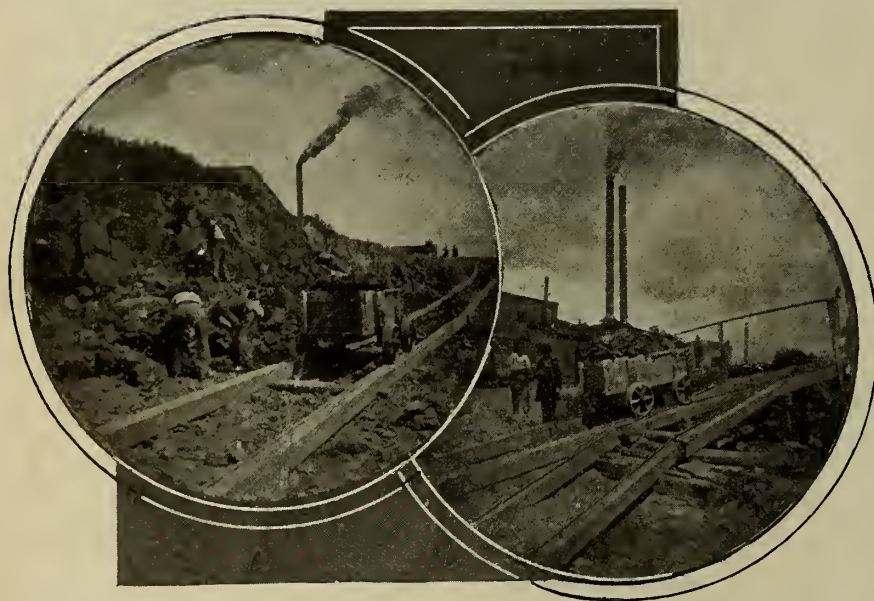
We recently visited the old yard in company with Mr. M., to whom we are indebted for much valuable information and a very pleasant drive, and found the work in all the varying stages from the digging of the clay from the bank to the loading of the burned brick in wagons, going on under the supervision of a young son, who, though fresh from college, did not seem afraid of soiling his hands and garments with brick dust. It is an inherited trait, we take it,

length. It is thrown into a disintegrator or feeder similar to the Emens (see illustration on page 85), thence into a conical roll crusher, which separates and removes the large pebbles and stones,

of which there is a goodly quantity, and feeds the clay into a Little Wonder brick machine, from which it is forced in three streams and is cut into proper lengths by a Cunningham Automatic Cutting Table, a cut of which may be seen on page 97. The work of this

and they now burn pieces 24x24 inches with almost no loss at all. The coping is set in the kiln on end as shown in the small engraving.

When returning from the yard Mr. Moulding pointed out many fine buildings built of brick from his kilns, indeed the whole north side is dotted over with these monuments of his industry.



CORRESPONDENCE.

THESE COLUMNS ARE OPEN TO ALL. THE FULL NAME AND ADDRESS IS REQUIRED BUT WILL NOT BE PUBLISHED EXCEPT WHEN PERMISSION IS GIVEN BY CORRESPONDENT. THOSE DESIRING TO COMMUNICATE PRIVATELY WITH ANY CORRESPONDENT WHOSE FULL NAME IS NOT GIVEN CAN DO SO BY ADDRESSING LETTERS CARE OF CLAY-WORKER.

Gaseous Fuel.

Editor Clay-Worker:

When Mr. Waplington said in his paper that 30 to 40 per cent of the fuel (not cost of fuel) might be saved, and says in another article that Mr. Davis was perhaps nearer the mark when he



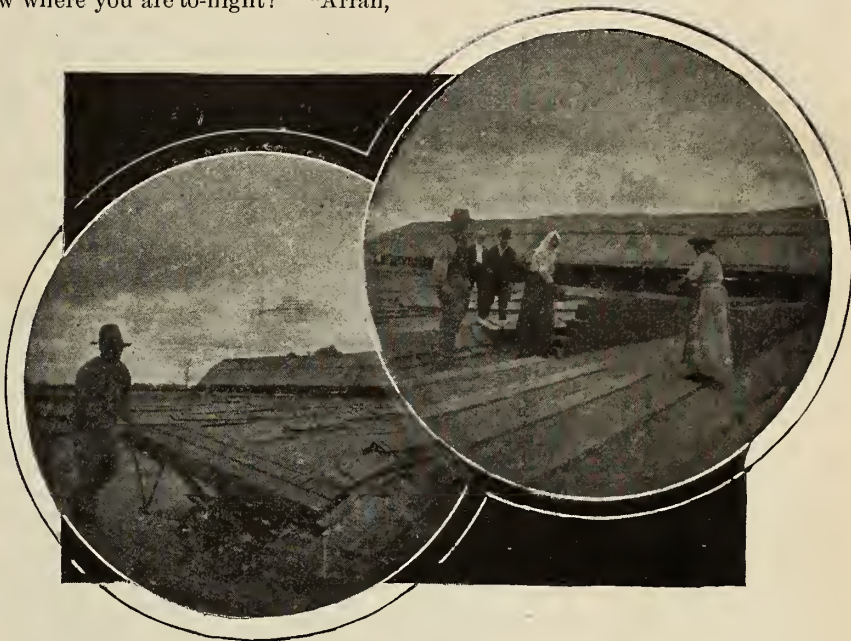
said 75 per cent was what we were wasting, I suppose meant just that.

Now, it would seem he means, that if we buy our coal for half price we save so much. I had thought he meant that the saving was in the perfect combustion of the fuel gas. He also says, that the unconsumed gas, in passing up through the bricks, actually cools them.

pipe into the kiln, any more than in the first method?

Mr. W. is quite right when he says, "I do not understand him, and I have 'waded' carefully through his Convention number four or five times." I had hoped his last paper would tell just how he saved and where we wasted. I can't help being reminded of the North Country Skipper, who, posing over his chart one foggy night, saw his Cabin boy watching him. "Ah boy," said the Captain, "what would your mother give to know where you are to-night?" "Arrah,

seems to me to be the statement. To see if we were wasting any amount of gas, we placed a sheet iron pyramid gas-tight, covering 9 square feet with a pin hole in the apex, on the top of our kiln with all proper precautions to save or collect any gas coming up. Those unconsumed cooling gases didn't show up. Our gasometer was hot enough, but not a flame of any kind could be seen from the orifice. What became of it and where did it go? It failed to cool the top of the kiln for that kept getting



Captain, darling," said the boy, "what would you give to know yourself?"

I don't know very much for certain, but I have fussed and read all my life,

hotter until at last the whole was at an almost white heat.

I have no desire to be officious, and have no motive except to save men younger than myself from traveling in the wilderness of unprofitable experiment, as I have done; although I hope I am now out of it. S. P. CRAFTS.

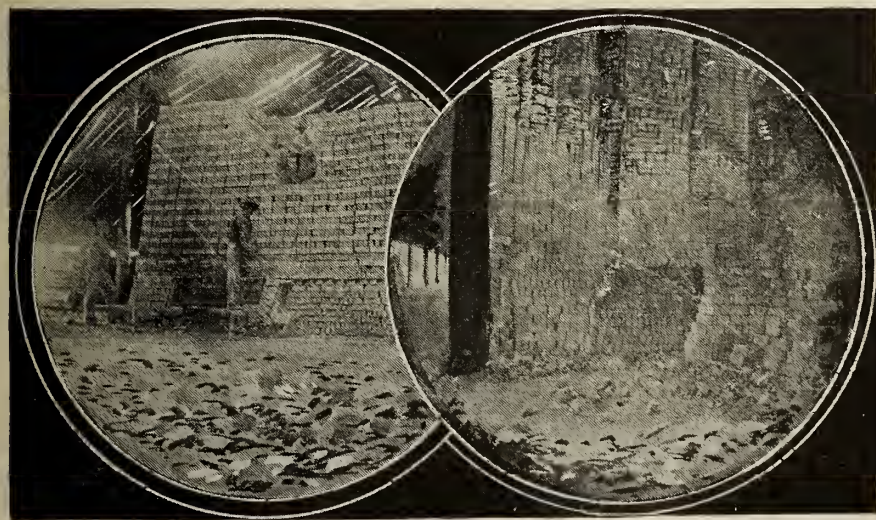
More Brick Literature Wanted.

Editor Clay-Worker:

Dear Sirs:—Enclosed find \$3.00 for the 'Brickmaker's Manual.'

There is nothing which would help the brick business at present as much as a treatise on brick as a building material, giving data whereby parties building could learn of the superiority and advantages of brick for the purpose, and giving items as to cost and other important facts concerning bricks.

Such a treatise should contain some of the valuable articles on brick as building material, by Dr. Brown, which have appeared in the CLAY-WORKER and I think all the matter for such a treatise could be compiled from what has al-



What kind of gas does he mean? If it will not burn when made and used for a white heat furnace, why will it burn after being sent through a flue or

but I never before heard that gas escaping from a temperature which sometimes melts brick like wax, had a cooling effect. The only cool thing about it

ready been written on the subject. If such a treatise could be published in pamphlet form to be distributed by the brickmakers among builders for from 50 cents to \$1.00 a copy, I think the demand would be very large. I, for one, would take 20 or 30 copies to start with, and I think no other investment would pay me as well. There should be also published a treatise of the same character relating to brick as a paving material. If you wish to do a good turn to yourself as well as to the craft I hope you will give this your earnest consideration.

JAS. D. THOMPSON.

FORTUNA, CAL., MARCH 9, 1891.

The Clay Shingle the Coming Roof.

Editor Clay-Worker:

There is probably nothing which affords more sincere pleasure than being able to endorse the views of a friend; the faithful critic and true well-wisher will not, however, hesitate to express an adverse opinion, if he considers it *pro bono publico*.

In May issue of CLAY-WORKER you published on page 512 an editorial in which it is stated that, in the opinion of Mr. Trevor of Lockport, N. Y., the "Clay Shingle" (made in Indianapolis) is "THE COMING ROOF."

This opinion has been arrived at by Mr. Trevor, after having "thoroughly investigated tile roofing both in the States and Europe," and having brought home with him samples of French tiles, which, however, were discarded on seeing the Clay Shingle, which he is convinced is "much better, more durable, cleaner, handsomer, lighter and cheaper." Even admitting the last two or three of these qualities, the claims of the Clay Shingle to be "the best roof," in my opinion, here come to an end.

For the benefit of anyone interested, or about to become so, in the manufacture, or use, of roofing tiles, I shall esteem it a privilege if you will kindly allow me to state some of my limited experience on the subject.

Being convinced that there was a good opening here for the manufacture of roofing tile I, some time ago, asked our mutual friend, Mr. D. J. C. Arnold, to send me the machinery required to try the thing on a small scale, drawing his attention to the cut of this Clay Shingle in the CLAY-WORKER, as being something like what I wanted. In due time the machinery arrived, but, though I have succeeded in turning out a well made tile, I have never been able to sell any of them, the Mexican buyers preferring to give \$75 to \$100 a M for the imported French tile, to buying this Shingle (which is less than half the size) at a fourth of the price.

This Clay Shingle has, in addition to disadvantages such as smallness, insufficient overlap to insure against leakage in a heavy, driving rain, two defects which, in my opinion, almost *prohibit its use as a roofing material*. First, it is, I consider, *necessarily* from its shape and

form *impossible* to make it strong enough to withstand the *risk* of some of the tiles being damaged by the weight of a man of average size passing over the roof. Second, it is *fastened on with nails*, which as far as I can see, renders the repairing of the roof in this (or any) case *exceedingly difficult*, if not almost impossible. If I am mistaken on any, or all, of these points, I shall be glad to be corrected.

Satisfied that there was nothing to be made by the manufacture of this Shingle, I asked Mr. Arnold to send me dies etc., to make a roofing tile similar to that imported from France and universally used here, forwarding at the same time, a sample tile to explain exactly what I wanted. These dies have only lately come to hand, having been delayed very much enroute—luxuries which people living in countries like Mexico enjoy. I hope soon to make a practical test of the manufacture of this tile, concerning the success of which I entertain very little doubt, and the result of which I will report in a subsequent letter, if you consider it of interest to your readers.

I may mention that the test will be watched with considerable interest by a good many people in this country. Numerous attempts have been made to produce this roofing tile, but all, I think, have been abandoned. The conclusion arrived at bring "*el barro no seroi*" (the clay does not answer.) The principal difficulties encountered were, I believe, warping and cracking, principally in drying.

These troubles I have overcome (largely by the help of the CLAY-WORKER) in every thing else, and I do not see why this tile should prove an exception.

It will probably be necessary, to carry on the business on a large scale, in import labor from the states or England; not necessarily experts, but intelligent, valuable help. This is a thing almost impossible to get in this country, and is one of the rocks upon which a great many enterprises started in Mexico, have been wrecked.

I hope the Clay Shingle Co. will not feel annoyed at anything I have said, and that they will not consider me intrusive if I respectfully advise them to enquire into the merits of the roofing tile afore referred to.

It is a large tile exposing about 112 square inches to the weather, hung on the sheathing by cleats made on the tile; the tiles all interlocking and being capable of being fastened on from below with wire where deemed or found necessary. It has also deep channels to carry off the water, and correspondingly high ridges, giving it that corrugated form.

Mr. Arnold will, I feel sure, be happy to give any information required on the subject.

I was somewhat surprised to read in a letter received to-day written by one of the leading firms of manufacturers of clay-working implements in America. "The making of Clay Shingles, or roofing tiles

is a new industry in America, but two kinds being made in the entire country to our knowledge, the Donaldson and Akron."

Before concluding I want to draw your readers attention to the closing paragraph of your editorial "Supply and Demand" in April CLAY-WORKER.

That Mr. Trevor is right in his opinion, that "the Clay Shingle is *the coming roof*," I think no man of judgment and foresight will deny; but it will be a Clay Shingle exposing more than 48 square inches to the weather, strong enough to resist all ordinary risk of breakage, and *which will not be fastened on the roof with nails*.

R. M. GREER.

Tuxpam, Mexico.

P. S.—Though late in the day allow me to express my satisfaction with the advance made in the price of the CLAY-WORKER. The only objection is that it is *still too low*, especially if in addition to the substantial standing dishes, you propose to add to your *Menu* such tid-bits as Hydro-Carbon and Mr. Gibson's letters. The latter are especially interesting to the writer, who is familiar with nearly all the ground over which he has yet gone and can corroborate much of what he has said.

Reply to Mr. Greer.

Editor Clay-Worker:

As your correspondent, R. M. Greer is seeking information, I am very glad you have given me the opportunity to answer some of the objections he raises to the form of Roofing Tile made by the Clay Shingle Co. Mr. Greer evidently has formed his opinion of this tile, and perhaps ordered his dies made from the cut in the advertisement in your paper. That cut only shows the face of the tile as it appears on the roof. It does not show the under side of the tile. I give herewith an engraving of the under side of the tile, that will explain away some of his objections if he will examine it carefully. If he will come and see the tile as we make it, and see the roof after it is on, I think they will explain away all the rest.

You will see there are two ribs, a gutter and a lip, on the under side of the tile. The ribs strengthen the tile, and as they fit down on

the top of the tile below they form a lock. With this lock, and the side covered for three-quarters of an inch, and the top overlapped two inches by the tile above, they are held in place so securely that no heavy wind can move them. They have stood the heavy prairie winds of northern Illinois, and they have some lively winds there. The nail is an additional security, and as it is entirely covered it is protected from the weather. The lip on the under side is



to prevent any rain or snow from being blown up through the joint. The groove on the under side fits over the projection near the top of the face for the same purpose. Now if Mr. Greer will lay this cut beside the cut in the advertisement, he will see how they fit and work together.

The *opinion* of Mr. Greer that the lap is not sufficient to insure against leakage in a driving rain is one thing—the *facts* on these points is another. A. S. Markley, Superintendent of Bridges and Buildings of the C. & E. I. and C. & I. C. R. R's, at Danville, Ill., has had these roofs on railroad buildings at Danville, since 1887. Mr. Markley is a good mechanic and a man of unquestioned integrity. In a letter in regard to this tile roof, he says: "The winter just passed has been a very severe one on roofs of this kind—extreme changes of weather, with considerable rain, sleet and blowing snow. There is not the least indication of any defects whatever, and it is perfectly rain, wind, snow and fire proof. The buildings that are covered with the clay shingles are here, where they can be seen at any time." Now, Mr. Markley has charge of the buildings on which the roofs are, he knows what he is speaking about, and he is where he can be seen or written to. And so say all who have the tile roofs.

The size of the tile, instead of being an objection, as Mr. Greer says, is one of its greatest advantages. The tile is 7x10 inches; when laid each tile is exposed 6x8 inches, making it much easier to fit in hips, valleys, gables, and towers, than if larger, and so much easier to make and burn straight.

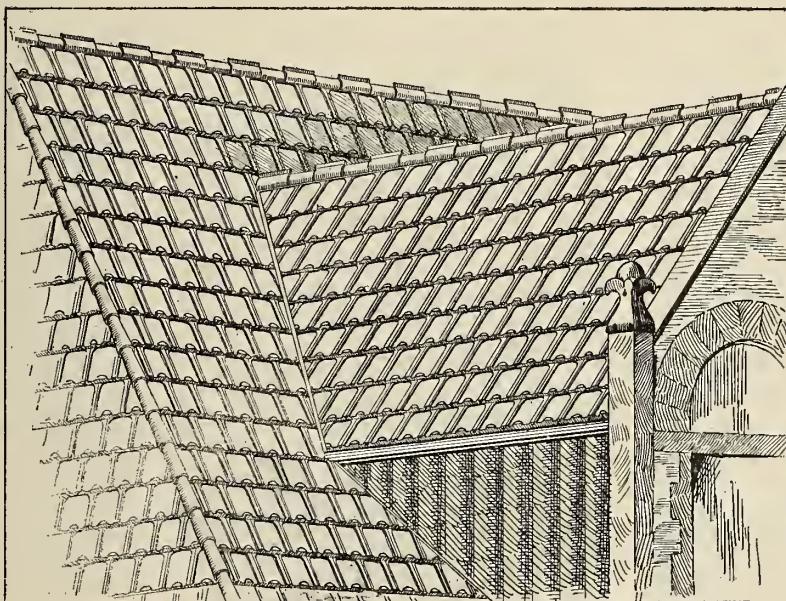
Roofs, as a general rule, are not highways, but this tile can be walked on, as slate is, if you step on the laps, or you can place a ladder on it and go all over it, and if one is broken it is the easiest thing in the world to slip another in its place until the ribs lock on the top of the tile below, and it will stay forever without a nail. This is the only form of tile roof made that can be repaired so easily, as no other tile has such a perfect lock.

As Mr. Greer refers to the roof of Mr. Trevor, of Lockport, N. Y., it is but fair that I should give two brief extracts from his letters, and then you will know exactly what he said. On May 21, 1891, he writes: "I am glad to know my men are putting the tile on right, and that they will not lift with the wind. * * They have broken very few in laying, and it certainly makes a fine roof and is attracting much attention." On May 30 he writes: "If the Buffalo parties call on me, I shall take pleasure in showing

them the best and handsomest roof in western New York." And Mr. Trevor is not the only one who will give such testimony.

I believe I have answered all Mr. Greer's objections to the Fire Clay Roofing Tile, but before I go to another point I would like to know if Mr. Greer read all of our advertisement in the CLAY-WORKER. That advertisement clearly says our form of tile is patented.

Now a word as to the French tile. Mr. Trevor sent me a sample of French tile. It is a splendid tile, and will make a splendid roof, but it has its objections. One is its size. It is too large to make by machinery, and burn straight and true. The tile I saw was made in a plaster mold by hand—regular terra cotta work, which is expensive and requires skilled labor. Another is its weight. The building and roof timbers must be very strong to hold it. This is one great objection to all roofing tile, and which our company has overcome,



A CLAY SHINGLE ROOF.

as our tile is lighter than slate. Another is its cost. The Mexicans are five hundred years behind the Yankee in a great many things, and, among others, in roofing their houses. They can stick to the heavy old form of tile their ancestors used—we want something handsomer, lighter, cheaper and better, and we have it in our form of tile. There is no patent on the French tile, but Mr. Greer had better go slow, in trying to make it. A great deal of money has been lost in experimenting on making tile.

There are three large establishments in Baltimore making roofing tile, and they have put on some very fine roofs, but they are heavy and expensive.

Now our Company have no expensive machinery to make tile. After the clay is prepared a Penfield Brick Machine forms the sheets, a Raymond Repress forms the tile, an up and down draft kiln burns them. The process is simple, easy, and requires very little skilled labor. We have got through experi-

menting, we are making tile, and the orders and inquiries we are getting show they will be used, and every man that has a tile roof will advise his neighbor to put one on. It is beyond all question the coming roofing material, and, I say, in good faith, spend your money in making tile, and not in trying to invent machinery to do it.

I am very glad you have given me the opportunity, and Mr. Greer the excuse, for saying what I have about tile, and if Mr. Greer will call at our works we will gladly show him how simple and easy it is to make tile when you know how. We make no secret about it—have no fence round our yard—for we feel that we are abundantly protected in our form of tile by the patents issued under the broad seal of the United States.

J. R. ELDER, Pres. Clay Shingle Co.

Philadelphia News.

Editor Clay-Worker:

I have postponed writing this letter from time to time, in hopes, always, that I would have a more cheerful story to relate. But as it appears to be getting worse, instead of improving, I think I had better have it over.

The trade has never been in such a completely demoralized condition, as it is at present. There is no demand, at all, for our product, and nothing in sight to warrant us to look for any improvement, for some time to come.

Some of our largest works have not had a fire under their boilers, nor tapped a mold yet this season. Others started, ran along for a while, got disgusted piling up brick and closed down again. Those that are working are doing

it in a half-hearted way that is discouraging. During the past few years, when any accident occurred, or any repairing was required, it was done on Sundays, or at night—anything to get started in the morning again—could not afford to lose the day—wanted the brick too badly. Now, when anything of the kind happens, it is looked upon as a good excuse to lose three or four days, to help keep down the stock of brick, and yet keep the plant from closing down entirely. This, of course, has had its effect upon prices. They have tumbled so rapidly during the past three months, that it requires a man with wonderful good eye-sight, and good perception of moving objects to keep sight of them at all. This, again, has had its effect upon a department of the business, that all lovers of "Good work with Fair pay" dislike so much to see—the wages. In many cases the reduction amounts to as much as 15 to 25 per cent. This reduction, coming on top of one of 25

cents per day on the skilled labor, that took place before the start in the spring, makes it all the more severe. And, now, let me call attention to this one important fact, viz.: That these two cuts in wages have caused no "Labor Troubles," that was predicted for us at the Convention. And the men, who have submitted to it with such good grace, certainly deserve good treatment at the hands of the men who employ them, and an early advance to the old list, as soon as the price of brick will warrant it. But, right here, generally, comes the rub, and the "Labor Troubles." The wages are, as a rule, cut when the first horn blows, but seldom, if ever, increased until the last horn blows, and then it is the employees who have to blow it, by demanding the increase and striking to enforce it. They, then, are blamed for causing all the "Labor Troubles."

But with anything approaching fair treatment, I guarantee that there will be no "Labor Troubles" among our Philadelphia boys.

As to the country yards that have been annoying us, more or less, by shipping brick alongside our works for about what we could make them for, they are reaping the benefit of it at present. You can buy them for almost any price, and upon any terms. Shouldn't wonder if you could buy now for "\$10 down, \$1 per week until paid for." Some of them—the new ones—did not get running long enough to get right good and dusty, until the cyclone in prices, etc., struck them, and they have accepted the inevitable, and closed up—to wait for the next "Boom"—were too late getting in on the last one. These "Booms" don't wait for you. You have got to be there waiting for them, or they'll get past you.

We got the amendment to our mechanic's lien law through the Legislature. It is to prevent the original contractor from signing away the right of a sub-contractor, to lien for material or labor furnished to a building. It is a good thing for us who so often sell to sub-contractors. But, as one of our brickmakers remarked the other day, "We're not selling enough brick to make up a lien on a 4-room house."

I was in Baltimore some few weeks ago. I found the trade there about on a par with what it is here. In fact you could use the first half of this letter, with a Baltimore heading, to describe the condition of things there. I also found them complaining sorely about the looseness of their lien laws. They are going to try their skill at getting a good one passed at the next session of the Maryland Legislature. I furnished Bro. Creager with a copy of ours, for a foundation for theirs. They should be able to get up a good one, with ours to start with.

Pitcher & Creager and Young O. Wilson have the contract to supply the Belt Line Tunnel with 30,000,000 hard brick. This is making both firms hustle. They each run two Chambers machines, in

addition to a number of hand gangs. The Chambers' brick were selected by the contractors for the tunnel, after condemning some others made by a different process.

I also called on Bros. Voyce, Baker, Donnelly, Perot, etc. They are all red-hot for a Washington, D. C., Convention.

Across the river from us, in Camden, they are doing business about on the same plan that we are. Likewise in Trenton. Most of them being satisfied to make from about one-half to three-fourths of their usual output.

I think I had better stop right here. If I keep on in this vein, much longer, I may expect to see a nosing committee from the South and West in this part of the country sometime soon, looking up the funds of the N. B. M. A. They would have good cause to come, too, judging by the way Treasurers, etc., as a rule, are handling money in this part of the country lately. I'll write you again soon. KALI.

How to Start a Balky Kiln.

Editor Clay-Worker:

I was in hopes you might find time to stop at my office again before leaving the city, as I received several letters that day in answer to my advertisement in the CLAY-WORKER which I wanted to show you. Among them were two from Iowa, one from West Virginia and one from Kentucky, and so they come from far and near every day, from which I judge the CLAY-WORKER covers a very wide field, indeed.

A neighbor brickmaker of mine came to me a day or two ago for advice on a matter that may be of interest to many



of your readers. Though an old brick burner he was having trouble with a kiln which he fired several days before, but was unable to make any progress in burning, the arches having become clogged with soot. I find that very few of even the old brick burners of Chicago know how to treat a "stuck" kiln, so I will give my remedy for the trouble. If after burning a few days and the fires do not make the headway they should, the smoke coming out of the fire holes or arches instead of going up through the brick, I know the draft is clogged by the soot, and must in some way be opened up before anything can be accomplished. My remedy is to dig down from the top of the kiln six or eight courses and with the brick taken out build up chimneys over four or five of the coldest spots in the kiln. I then take half dozen or so pop bottles or pieces of gas pipe or anything that can be charged with powder, fill them with powder and plug them up and throw

them into the arches. The explosion will loosen the soot, and the additional draft obtained from the small chimneys will soon start the most obstinate kiln. Many of my brother brickmakers, especially the old country folks, will say "that remedy is as old as the hills." So it is, but it is good and I give it for just what it is worth, and it may be worth a good deal to some of the inexperienced.

THOS. MOULDING.

CHICAGO, ILL., JULY 1, 1891.

From Over the Sea.

Editor Clay-Worker:

It has been a long time since you have heard from me, but it has not been my fault. Since answering your esteemed favor of October last, I have had a great misfortune that sunk me in distress and sorrow. It was the death of my good father which happened six months ago.

Now following the natural stream of mortals, I begin anew my poor and unlearned communications by telling you that it was quite late when the July, 1890, Clay-Worker reached me, which is the reason that I have not yet thanked Mr. Rob't M. Greer, of Mexico, for his kind advice, which I have followed as near as possible, and have begun to reap its advantages. For instance, my brick do not come out melted in the arches and unburned on the top. On the contrary, I have very well burned brick and I have saved one day in work in burning the Dutch kiln by sifting the coal which is rather small. My clay is now very easily brought from the clay pit, by hitching a team of oxen to the dumping cars, doing double the work, and I hope to improve a little more by laying steel rails, which I ordered from New York some time ago. Of course, I am much obliged to Mr. Greer and, also, to the CLAY-WORKER, which has given me the pleasure of his acquaintance, and wish you great progress in everything.

As I consider you the Father of all brickmakers throughout the world, I am indebted to you for the success of our business here. Two months ago I finished erecting my new brick machine, driven by steam power. It is something very similar to that of Messrs. Nolan, Madden & Co., illustrated in the CLAY-WORKER. It is very simple and has a very nice delivery wire cutting table that throws eight brick on each pallet very clean and good. This has enabled me to work by the pallet system, though at a great cost, because a wood pallet made of green wood, though poorly made, costs here nine dimes instead of one, which is the price of wood pallets in your fortunate country. I am now waiting for wagons and iron work to build an improved dryer of Mr. Geo. W. Sharer, but it was impossible for me to order steel pallets for same, though they only cost 4 1-2 dimes there, because 3,000 pallets, which I would want at least, weight 36,000 lbs, and the freights and

custom rights are very high here, and they would cost me more than \$1.50 each for transportation, a half a dollar there in the foundry packed, which would make \$2.00 each or \$6,000 for the 3,000.

I have also endeavored to build a square kiln like Mr. Eudaly's but I could not get the right plans nor a practical man to come from there to build it. We people who have never seen those frames, and have only an imperfect idea of them from the illustrations in papers and catalogues are not able to build a scientific kiln from the plans. You can never appreciate the happiness of work in a civilized country like yours.

Business is very dull here now; there is little construction going on in the city, which has brought brick down to 30 per 100, and the municipality has increased the right of taking a car of 125 brick through the city to \$8.00 a month.

Truly Yours,

RICARDO CALVO.

Bogota, South America.

Enameling Brick.

Editor Clay Worker:

In your issue for February I notice a paper from a clayworking scribe, giving a description of brick and brick manufacture in Europe and the uses to which enameled brick, more especially, are put, and I am quite sure what he says ought to be sufficient to stimulate your American brickmakers to turn their attention to something higher than ordinary brick-making, though this, no doubt, is a business reaching to very large proportions. But what I note in reading your journal, is, that in your conventions, which are essentially meetings called together by the brick and tile makers' associations to discuss the methods of brickmaking adopted in various parts of the country for the benefit of the craft in general. I see absolutely nothing brought forward, bearing on the higher branches of the art of clayworking, such as enameled brick, blue vitrified brick, architectural terra cotta, glazed roofing tiles in various plain and ornamental patterns, etc., which leads me to the conclusion that these things have not been thought of, and have, therefore, not at all kept pace with the enormous development of the ordinary brick manufacture. I shall be glad to give a paper on each of these subjects, as opportunity may enable me to do so, but what I wish to point out in your correspondent's letter, is, one or two conclusions, with regard to cost of production, which I think are misleading—not in any hostile spirit, but as this is a question of prime importance, bearing on this subject, I think it is not out of place to notice it here.

Your correspondent says, "Americans are sufficiently progressive to use an article of this kind at a moderate cost and there is no reason why they could not be made and made cheaply."

Again, further on, he says, "brown

brick are also in common use, that is, a brown glaze brick; this is one of the things before our American brickmakers which can be made to pay, if the brick is sold cheap enough and *they certainly can be made at a low cost.*"

Again, he says, "a brick with about the same glaze that is put on our brown or gray stone jugs and crocks would certainly be popular and *there can be no question as to the possibility of doing this work at a low cost.*"

You see, sir, how your correspondent warms with his subject. I can imagine that he was in an ecstasy of delight at seeing these goods on every hand, at contemplating their beauty, purity and cleanliness, and seeing them used in the commonest of buildings, and in the exuberance of his feelings he spoke as he thought and not according to knowledge, thinking, no doubt, that an article used so universally must of necessity be made at a low figure. What your correspondent's ideas are as to cheapness and low cost, I am not able to say, but, judging from what I see of the price paid for best face brick, which runs up to eighteen dollars per thousand, I should say they would not be reluctant to pay a corresponding price for bricks of such beauty and utility as enameled brick are.

First impressions, whether good or bad, are very hard to erase, and if by reading the paragraphs quoted from your correspondent's letter, any manufacturers should think that these bricks are made at a low cost, or that they are sold at a low price, he will be deceived, and, if he should think that he can do it in this way, he will be deceived again.

The best enameled bricks in this country have always held their own, and have never varied much in price, and are selling now at from £10 to £16 per thousand, and colored bricks are more. Some of the colors are very expensive, the bricks varying in price according to the cost of color up to £32 per thousand. The price of labor is correspondingly high, and good men are not often out of a job.

One thing more I notice, is, that your correspondent advises his friends to experiment with the glaze used on the jugs and crocks. You know, sir, when the blind lead the blind, what place awaits them at the end of their journey. If our friends wish to court defeat and disappointment these crock glazes are the straight road to it. It is what I call tinkering, and tinkering never did pay in the brick business. But to do this in starting to make enameled bricks will be simply ruinous. The best enamels and glazes for brickmaking are to be made from the materials, a list of which I have given, and from which I am making enameled goods equal in quality to any produced in this country, and there is no other that will make them. Touching the question of cheapness and low cost, in this one particular I beg to advise your readers, that the jug and crock glazes can be bought in this country at from 30 shillings to 32 shillings

per cwt., but I can make up the very best glazes (white) from the materials I have given at 10 shillings per cwt. I may say that the jug and crock glazes are made from the materials I have given, as well as the brick glazes and enamels, and if it is well to experiment with them on brick, I say it is very much better to let it alone, and, my last word is, don't do it.

In coming back to our subject, I will now proceed to describe the method to be adopted in the manufacture of enameled bricks. In the first place the clay must be well prepared; it must be free from all roots or grass, or any fibrous matter, that would burn out; it must be ground fine and even; it must then be well tempered, not as we say in brick-yard parlance—"sink sludge and matts," or "crabs," and another unmentionable substance—but of very even temper and consistency. Then the bricks may be made by hand, or from a wire cut machine. If made by hand they should be made in brass molds. They should be made by a good molder. The clot should be well rolled and thrown into the mold with some force, and without cutting on the edge of the mold. They should be molded in water (no sand should be used) and the molds should be dipped about every two or three bricks, so as to cause them to slip clean from the mold. They must be carefully laid down so that they will not be out of shape. They should be put on to a warm (not hot) floor, and, when ready for pressing, should be picked up and put in to a cool place and covered well over with some kind of sacking, and stand twelve hours, so that they will come to an even stiffness. If the bricks are made by a wire cut machine there should be as little oil as possible used about the cutting table or rollers, as whatever oil there is used on them will all have to be removed before the enamel can be put on. I have found the best oil to use is common paraffine and a little olive oil put into it. Common brick oil should never be used. The bricks should be made as stiff as they can be handled from the machine. They should be hacked up in some convenient place about 7 or 8 high and stand until the steam is all out of them. They should be made through a die a little less than the press box, so that they will not want dumping to make them go clean and free into the press box, and all marks from fingers and thumbs or from any other cause must be avoided. The bricks will now be ready for pressing. Before this can be done racks must be prepared to receive them. These should be made of boards 11"x1"; any length to suit the size of the room in which the operations are to be carried on. They may be put up loose on bricks or in a permanent way on blocks of wood, well nailed together. This is the best plan, as it prevents them from warping and twisting. They should be eight boards high, with six inch space between and divided into sections to hold fifteen bricks in length. The upper surface of

the boards should be planed quite smooth, so that in sliding the bricks on they will not be marked on the back.

A word about the press. This should be a screw and should be the very best to be had. The box, cap and forcer should be fitted to a nicety, so that every edge will be cut clean, without a particle of fringe on them. Barrows will be wanted to wheel the bricks from the press to the dipper. These should be on springs, and should have two boards, one on each side the barrow, planed smooth, to hold ten bricks each. These things being ready, the operation of pressing may begin. The bricks must now be brought to the press on the barrows, above described, and placed on a table beside the press. The face to be enameled must be quite clean and free from all bits of clay; the person preparing them for the press must have a dresser and give the face a light tap, and, then, with a 10-inch pallet knife, make the face smooth and even. The presser must then take hold of the bricks in both hands and place them on the press with the prepared face towards him, being careful to push it far enough back, so that the prepared face will not touch the side box as it goes down. Now set the press in motion and see that every corner and edge is perfect.

MANAGER.

The New South.

Editor Clay-Worker:

Thinking that perhaps the other half of the world might want to know what this half is doing, we will submit a report, abbreviated so as to cover as much brick dirt as possible.

There has been a decided falling off in the brick output since last season correspondingly with other branches of business, on account of the unsettled money market, while the building business is less active, real estate transactions remain active, and are rather increasing in tone and price. Some of the old yards have put in some of the improved methods, and are adapting themselves to the market and its requirements, picking up a good trade at fair prices. Some of the smaller yards have dropped out of the race, which increases the business of the larger concerns.

The Arlington Brick Co., Caldwell & Graw, proprietors, are running two good Sword machines. 30,000 daily output; have put in an Iron Clad Dryer, of 25,000 capacity, also dry in open air, burn with wood, old way. They contemplate putting in improved kilns in the near future; are located nicely on R. R., side tracks to kilns, with good growing trade.

NEW YARD.

The Jones Brick Co., Russell & McCallum, proprietors, are making 30 to 35,000 daily. Two Swords improved machines, one Boyd Dry Press machine also a Steam Repress, (Oldham's patent,) use the Standard Dryer, and burn in Morrisons improved Kilns. They are the only

yard close to the city and haul their bricks to the buildings in wagons.

The Knoxville Brick Co., eight miles north on the K. & O. R. R., at Powells, have four Swords machines and a Boyd Dry Press, three Atlas Engines of sixty horse power each, dry in Iron Clad Dryers, burn in Morrisons Kilns, output 60,000 to 65,000 daily.

The Luttsell Brick Co., twenty miles north-east, also making for this market, running one Brewer improved machine; 20,000 to 25,000 daily, drying in sun; burn old way.

Peyton Carter, one Brewer machine 20,000 to 25,000 daily, open air drying, old style burning. Globe Brick Co., seven miles east at Caswell, making for this market; one Sword machine, have a flue dryer and also dry in open air, burn old way, make 20,000 to 25,000 daily. Scotts Brick Yard, ten miles south, one Sword machine, Swords hacking trucks, dry open air, old style burning.

The Knoxville Stone Ware Sewerpipe and Tile Co., are increasing their capital stock and contemplate adding more new machinery, and manufacture hollow building blocks, tile and paving blocks etc., and otherwise, enlarging their works. They are a new firm with push and energy, and are coming to the front with a good growing trade. They are making a fine article which finds a ready sale. Their works are located on the East Tenn., Va., & Ga., R. R one and a half miles from Knoxville.

Cooper Brothers at Lenoir City, twenty-five miles west of here, have just burned their first kiln of brick. They were delayed in getting started on account of the machine they first selected, failed to make brick and had to be taken out and another substituted. The same case occurred up at Bristol, on the border between Tenn., and Va., on a new yard started by J. T. Powell & Co., and they have not yet got on the market with bricks. Charles Gothier also of Bristol, (Va., side) has thrown out two of the Wiles soft mud machines and put in the Enreka Dry Press, and is otherwise, enlarging and improving his plant. He is a hustling young man from Troy N. Y., and is making his mark on the side of the red clay hills, along side the South Atlantic & Ohio R. R., with plenty of clay and cheap fuel.

The firm of Sevier & Palmer at Bristol, were preparing to burn their first kiln; have a Brewer machine and are going to gain experience and money, we hope. They are gentlemen and good candidates for admission into the mysteries of mud mixing.

The firm of Smith & Wilson at Bristol, are moving along at their old stand, but will be obliged to move to a new clay bed after this season, use a Brewer machine, sunshine drier and burn with a Pharaoh & Moses Kiln. They will quite likely adapt some of the improved methods of drying and burning as soon as they locate on a new clay site. At Johnson City, Tenn., we found business quiet. Two yards were idle and two in

operation. The Johnson City Brick Co., are running an improved Brewer machine, have a steam heated floor dryer, making 25,000 daily, burn old way, and will put in Morrison Kilns soon as trade survives a little in their line.

The firm of Hoss & Harding, were burning their first kiln for the season. They run a Brewer machine, and burn on a plan of their own, which will revolutionize the whole brick business; they do not case up or scove their kilns. They did not authorize me to do so, or I would say. "Write them for full particulars."

BRIX.

A New Clay.

Editor Clay Worker:

While we have entitled the subject of these lines "A New Clay" it is, strictly speaking, not correct; but certainly to most clay workers, SLATE (ROOFING SLATE) is a new clay.

For a short time, comparatively speaking, two or three concerns have been working the rubbish from slate quarries into brick with fairly good success. These experiments have been watched with a great deal of interest by a number of eastern capitalists. For more than a year Judge Greene, of the Supreme Court of Pennsylvania, and others have been largely interested in the manufacturing of press brick from slate, at Philipsburg, Pa. They have had good success in forming the ground slate into brick, but have not succeeded very well in the burning. I think, if I am correctly informed, that the Judge is the owner of patents covering the process. The Philipsburg plant will soon be enlarged so as to add quite an extensive enameling department.

But perhaps the most extensive plant now under process of construction is the one at Pine Grove Furnace, Pa. Mr. J. C. Fuller, Esq., who is so well known in railroad circles as President of the Gettysburg and Harrisburg Railroad, is the owner of a very large estate at Pine Grove Furnace, consisting, among other properties, of lands to the extent of something over 25,000 acres on which he has a large iron furnace, forge and also, large roofing slate quarries.

Mr. Fuller, proposes to further improve his valuable property by erecting a large clay working establishment, for the purpose of manufacturing all kinds of clay wares of the debris from his slate quarries. He will first construct a plant to turn out 40,000 dry press brick per day, at the same time an enameling department of about one half the above capacity; later on he will add flooring and all kinds of art tile. The brick department will consist of four large dry press brick machines, dryers, and 10 Eudaly, large, square, down-draft kilns. He will have both steam and water power. He will have in operation seven large dry pans.

The difficulty heretofore experienced in manufacturing brick from roofing slate has been the pulverizing of the

clay. Mr. Fuller having large experience with heavy machinery, and having spent several months experimenting with and investigating the subject of pulverizing slate has come to the conclusion that the dry pan is the only practical machine for the purpose.

Philadelphia capitalists are watching Mr. Fuller's enterprise with a great deal of interest: and we have sufficient information to warrant us in saying, that as soon as Mr. Fuller's success is assured other capitalists will invest large sums of money in like enterprises.

I have recently seen very fine English flooring tiles made from slate said to be much inferior to that found in the quarries at Pine Grove Furnace. Taking this fact together with Mr. Fuller's push and thoroughness we feel almost certain that he will make a great success.

W. A.

Out of Sight.

Editor Clay-Worker:

In my last communication I spoke of the "shoals of Lumber Boycott" as one of the troubles of navigation of the "Ship Brick." She safely passed it. The Captains' eyes are all landward "looking for the lights along the shore." The Brick sky is very lurid at present. In fact, some of the captains are running masts down and some of them have dropped anchor. Only think of it, during the best months of the year to stop making brick. It does not seem possible, but still the fact remains that one of our yards dropped one machine to-day, another stops altogether. In all the annals of brickmaking, I do not think the Fourth of July ever found so many old or last season's brick on hand. The yard that has just stopped has about twenty arches or about 800,000 of last season's stock unburnt. At Haverstraw two of the largest yards have been lying still for the past three weeks. At Fishkill one yard has stopped. At New Windsor there are two more, and probably from that point to Albany there are more, but your scribe has no information.

I do not know of any better description of the state of trade than to quote the words of the good Methodist Preacher. When he went to conference the question was asked him, "How is the state of religion in your district?" His reply was rather an unusual one, it was simply that it was "Looking up." Some of the brethren wanted to know what he meant. He replied that "It was flat on its back and could not look any other way." That expresses the condition of the brick market exactly. It is down, and at present writing is no indication of any improvement. This season the manufacturers are very choice about the weather. Within the past two weeks they have lost five days on account of rain. Other years they would have laid down boards to truck on. This season they do not want any washed brick. The outlook at present is that by the first of September the majority of

the yards will be shut down for the season. I was in hopes that the unexpected would take place and that I would be able to report a little better feeling in the trade. One of the manufacturers told me that he had heard that there was an advance of 25 per M. This was good news indeed, as it would show that "low water" mark had been reached. From information at hand from this market, I am sorry to say it is 25 per M lower. The prices are about as follows:

Up Rivers, \$4.37½, \$4.75; best \$5.00.
Fishkills, \$5.00; best \$5.25.
Hackensacks, \$5.00 and \$4.00.
Haverstraws, \$4.75; best \$5.50.
Washed, \$4.75 and \$4.50.
Pale, \$1.50 and \$2.00.

At present writing there is about 3 million brick lying on the market unsold. As most of the yards in Haverstraw are leased or they pay \$1.00 per M for clay and some \$1.25 per M. for freight, then sell the product for the figures quoted, it looks as if the manufacturers would have to eat "snow balls" next winter. At present it would seem as if New York prices had razzle dazzled the manufacturers. There was a job that would take about 200,000 brick. I am reliably informed that there was a bid put in for \$4.60 for washed brick, and at best a team could only dump about seven loads a day. In previous years the manufacturers would not looked at less than seven dollars per M.

I hope that by August there will be an improvement.

It is too early to get the number of permits for the six months of, 91. Will have them for next month.

A. N. OLTIMER.

HACKENSACK, N. J.

Machinery Exhibits and Conventions.

Editor Clay-Worker:

I have read with no little interest the letter in the May CLAY-WORKER from Brother McCain, of Denver, suggesting among other things the exhibition of machinery in connection with the annual conventions of the N. B. M. A., also the diplomatic reply to same by Brother Purington in the June number. Had I not known it before, this letter would have convinced me that the latter gentleman is a skillful politician, from the manner in which he jumps from one side of the question to the other and finally lands "on the fence." The pros and cons of this question are many—"much may be said of either side and either may be true," as demonstrated by Brother Purington.

The subject is really too broad to be covered in a short article, but as you have requested my views, will give them as well as I can in a condensed form. I noticed at the last Convention that there was some feeling on the part of a few of the members in attendance against the manufacturers of machinery and dealers in implements, kilns, etc. The objectors were so few, however, that

I am quite sure the doors of the Convention will never be closed against us. Such a policy would be suicidal for the Association. From the interest manifested by a great majority of the members at the last Convention in the small display made there it is plainly evident that the machinery men and their goods was one of the features of the Convention. I am convinced that many of the delegates came mainly to see these machinery men and learn what improvements they were offering the trade. It is true that exhibitions of machinery are, in a sense, educational, and benefit both the brickmakers and the machine men, by bringing the various devices under closer inspection and by comparison, demonstrating more sharply the strong and weak points of each, thus stimulating improvement, but so far as demonstrating the actual, practical value of machinery for hard every-day work, such exhibits are not what they are cracked up to be. The machines are always operated by skillful, experienced men, with clay that is known to be suitable for the particular process. Prospective purchasers may get some "pointers" from such tests, but it is not a sure thing. There is a question as to whether a particular machine will work this or that clay from the bank, as it does at the exhibit. It could be tested just as well, if not better, by sending a few barrels of clay direct to the machine manufacturer, or, better still, maybe, to some factory or yard, where the machinery is in actual practical operation.

Testing clay in this manner, even, is not always reliable and satisfactory, for it seems to go through a disintegrating process while in transit, which makes it work differently than when taken direct from the bank. To my mind it is very doubtful if the members of the Association, whether old experienced brickmakers, or new and inexperienced, derive much direct benefit from such exhibits of machinery as Brother McCain suggests. I am sure it would not be profitable to the machine manufacturers, so far as direct returns are concerned, for the number who attend the annual meetings and the time occupied by the Convention—three days—is not sufficient to justify the expense of making such exhibits, which is necessarily excessive, as machinery manufacturers have learned in the costly school of experience.

W. R. CUNNINGHAM, Sec'y

Wallace Mfg. Co., Frankfort, Ind.

Occasionally one sees an advertisement, (says Printer's Ink.) that has been spoiled by over care. It is like drowning a rare plant by pouring too much water upon it. The rich soil is driven away from the roots and the plant languishes from want of substantial nourishment. An inexperienced gardener can spoil a delicate plant just as an inexperienced advertiser can spoil an advertisement. Too many kinds of type are used, too many statements crowded in, and the effort is made to display too many different things.

THE CLAY-WORKER.

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Correspondence on all subjects of interest to Clay
Workers is solicited. Communications from prac-
tical men will always be welcome. Address all
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T. A. RANDALL & CO.,

81 Massachusetts Ave. Indianapolis.

GOOD, BETTER, BEST.

We have received several interesting communications intended for this issue, but, which, for lack of space, must now be held over till the following August issue. We must request our contributors to send matter intended for the current issue as early in the month as possible, for we cannot always make room for matter that is late in reaching us. The old proverb of "Better late than never" is good, but "Better never late" is best.

AN IMPORTANT SUBJECT.

We devote considerable space this month to the consideration of Roofing Tile. It is a very important subject—one that we have endeavored to advance and bring into prominence from the beginning of our work in this field. We have felt that with the production of a practicable roofing tile, an extensive and profitable line would be opened up to the clayworkers of America. Many new, and now little thought of, branches of clay work will eventually develop and grow to important dimensions as we progress onward, but none can be of more importance to the general public than that of incombustible and imperishable roof covering of moderate cost. Tiling is an ideal material for this purpose and that it has not been successfully made and introduced long ago is a matter of wonderment, for with our boasted faculty for invention and skill in mechanics it is certainly singu-

lar that tile roofing has not long since become common. We believe the time is now near at hand when it will be demanded for all of the better class of buildings. The clay shingle, of which we have made frequent favorable mention of late, is rapidly gaining in favor among architects and builders and we trust and believe that it will prove fully equal to the tests of time.

Our esteemed contributor, Mr. Greer, offers some unfavorable criticisms on a preceding page, but we are constrained to believe that he speaks unadvisedly, and that, on more careful investigation, he himself will conclude that "the clay shingle is the coming roof." With us, it may be, the wish is father to the thought, not because we have any direct interest in the clay shingle, for we haven't, but because we want to see tile roofing successfully introduced throughout our country.

PROFITING BY THE WORK OF OTHERS.

Our foreign correspondent continues his articles on the history of tile covering in this month's issue of the CLAY-WORKER. History, in a matter of this kind, is exceedingly valuable in that it illustrates the march of progress in a practical work. If we know what has been done in the past we may more accurately judge as to the results of experiments in the future. A little knowledge of history may save the expenditure of many dollars. France is a very progressive country in the matter of clay work. Hollow tiles for floor construction, partitions and like construction have been in use there for many years. They have carried the manufacture of brick, tile and terra cotta work to a very high state of perfection. A knowledge of what they have done and what they are doing, must necessarily be of interest to all clayworkers. We may not want to do just what they are doing nor in the same way, yet it may be exceedingly interesting to study their methods with a view of general enlightenment and general enlargement of view. People who labor constantly under the shadow of their own possessions, who do not look beyond themselves, are apt to suffer from complacency, self satisfaction and kindred forms of mental paralysis.

Our correspondent informs us that while there is some difficulty in securing information in regard to French work because of their jealousy and suspicion of those who study their methods, he

has at last succeeded in opening a way to a thorough investigation of all of their work. The matter of tile roofing will be carried down to the work of the present day by buying samples of all forms now in use, and making careful drawings thereof so that they can be adapted for American wants. The appliances for their production will also receive thorough investigation. The modern French tile is quite different from the one of history though the historical development is clear and logical up to the present date.

EDITORIAL COMMENT.

Our New York correspondent writes a doleful tale of the brick market in that section. There has been no improvement whatever during the month and the prospects are anything but encouraging for the knickerbocker brickmakers. Prices have reached the lowest point touched since 1879. Pale brick, for which there is little demand, selling as low as \$2.00 a thousand. Comparatively little building is being done and there is scarcely any hope for improvement this season. Other large Eastern markets seem to be somewhat demoralized though not to so great an extent. Throughout the Central, Western and Southern States a happier condition prevails. Generally the markets are active and prices good. The Chicago craftsmen are as busy as ever, while St. Louis is having a building boom that insures an unusually prosperous season there.

The announcement in the last issue that Newton & Co., fire brick manufacturers, of Albany, N. Y., had made an assignment was not correct. They write us that the old co-partnership has been dissolved and a new company organized and incorporated. The business will be continued under the old name, and, virtually, under the same management. This is one of the oldest fire brick plants in the State, having been established nearly sixty years ago.

The Interstate Constructing and Investment Co., of Portland, Ore., write that they are anxious to get in communication with people who can inform them regarding paving brick. They make a specialty of paving and will need a great deal of first class material. They consider paving brick the best material for streets and wish to know if there are any manufacturers in their vicinity. They would prefer buying to being obliged to start a factory, which has

been some thought of. The streets there are in a wretched condition, either in a mass of mud or dust, or occasionally poor specimens of different kinds of paving worn out long before its time. They say, the "Mossbacks" are rather backward regarding street improvements, but eventually a great amount of work in that line must be done, and that soon. They are an old company first incorporated East under another name, and consider that the Northwest is a good field in this branch.

Dr. A. L. Marcy, President and General Manager Southern Fire Brick Works, of Richmond, Va., informs us that that company owns one hundred acres of No. 1 fire clay land, and are now fully equipped with steam power and dry pans furnished by the Alex. K. Rarig Co., of Buena Vista, Va. They also have a large dry floor and will put in a brick machine soon. Their clay makes a high grade brick. They also, have an abundance of paving brick clay which they will utilize. During the summer they intend to erect a large sewer pipe plant. Their present building is a two-story, 50 x 150 with large boiler and other room additions.

Our St. Louis correspondent writes under date of July 10th as follows: "We Westerners can congratulate ourselves that we are not running in the same hard lines as our Eastern friends, as business has been brisk. The kilns have been kept busy, and there has been a good demand for all the brick that could be placed on the market, so that good prices have been readily obtained. This, too, in the face of the Carpenters' and Tinnners' strikes and the unusually wet weather during June, which interfered to a great extent with building operations. The same buoyant feeling prevails among the tile and terra cotta people, and the season in all clayworking lines is well under way, with the most flattering prospects for the future.

The shed covering one of the kilns at Brockschmidt's brickyard, near St. Louis, caught fire on the evening of June 30th, together with two other large sheds and a lot of cord-wood were consumed before the fire was extinguished. Mr. Brockschmidt estimates his loss at about \$2,000, with about half that amount of insurance. He refused to permit a fire alarm to be sounded, as he feared that more damage would be done by the water than by the fire, his kilns being under fire at the time.

Anticipation and Realization.

A bite! A bite!
The line grows tight!
I feel a sudden thrill of bliss;
A mighty twist
Proclaims a fish
At least as long as this:

Alas! alas!
It comes to pass
(As oft it has with you, I wis)
I pull him out;
He is a trout
As long, perhaps, as this:

—Detroit Free Press.

EDITORIAL NOTES and CLIPPINGS.

Shrewsbury, Pa., wants a brick manufactory.

Rankin Bros. are making brick at Creston, Ia.

Dr. W. L. Chrisman will start a brickyard at Eldred, Pa.

A new brickyard is in process of erection at Cromwell, Ct.

P. J. Slater had an \$800 blaze at his tile works on the 4th.

Loenstein, Allen & Veasy are making brick at Rockdale, Tex.

Reid & Capps, of Jacksonville, Ill., want to purchase a sand dryer.

T. B. Meeks will establish a brick plant at Grand Saline, Tex.

The Bessemer (Ala.) Fire Brick Co. intend to enlarge their plant.

Oliver Jernigan has established brick works at River Falls, near Troy, Ala.

The Westover Brick Co., near Grand Rapids, Mich., will put in an additional machine.

E. F. Hostetter's brick works near Columbia, Pa., were partially destroyed, by fire recently.

The Sioux City, Ia. Council, at one time recently called for bids for paving twenty streets with brick.

Henry Bros. are putting in additional machinery at their brickyard at Bridgeport, near Mobile, Ala.

Quintana, Tex., is to have a brick manufactory. It will be erected by E. F. Andrews, of St. Louis.

It is claimed that Boston, Mass., parties will establish brick works to cost \$100,000 at Fort Worth, Texas.

W. A. Dromgold and S. J. Stagemyer, of York, Pa., will erect a vitrified brick plant near Emigsville, Pa.

The Derbyshire Brick Mfg. Co., of Catskill, N. Y., has increased its capital stock from \$35,000 to \$60,000.

The capital stock of the Tower Grove Brick Works, of East St. Louis, has been increased from \$30,000 to \$50,000.

The Mound City Brick Co., Moundsville, W. Va., has been incorporated by Wm. Crockard, R. B. Curtis, and others.

The Emmetsburgh (Iowa) Brick and Tile Factory has resumed operations, employing between thirty and forty men.

The American Press Brick Co., St. Louis, has been incorporated by Jno. C. Hocker, Edward Ryan, Jno. A. Wiltey, and others.

Little Rock, Ark., wants a fire brick plant established there. They say there is plenty of good material in that immediate vicinity.

The Granite Terra Cotta Co., of Keene, N. H., is reorganizing under the name of the New Hampshire Moulded Granite Co., with a capital of \$100,000.

The Bloomington (Ill.) brickyards are enjoying the expensive luxury of a strike. There are 300 men out. An increase in wages is demanded.

The Streator (Ill.) Pavement, Brick & Tile Co. has been incorporated with \$60,000 capital by Rich. Evans, Jno. J. Gerahty, John Evans and others.

The New Orleans Brick & Tile Mfg. Co., of Mandeville, La., want an experienced man to take superintendency of a new brickyard, also some good brickyard hands.

The town of Manning, Iowa, has established a fire limit and hereafter all buildings constructed in the business centre must be of brick or stone. This is as it should be.

Holders of First Class Limited single or round trip tickets to Eastern points via the "Big 4" and New York Central routes are permitted to stop off at Niagara Falls ten days.

Cunningham & Taylor, of New Cumberland, W. Va., write that on the 2d inst. they ground twelve tons of fire clay in one hour in a "Standard" nine foot Dry Pan, made by Jas. Means & Co., of Steubenville, Ohio.

Fletcher & Thomas, Indianapolis, Ind., shipped to Greensboro, N. C., one of their complete outfits, Quaker Brick Machine, Pug Mill, Mold Sander, etc., also Engine and Boiler, and are now preparing for shipment to Mr. Ed. Simons, Los Angeles,

Cal., a complete heavy outfit, including 40-horse-power Atlas Engine and Boiler. They have within a few days sold and shipped Brick Machinery to parties in Kentucky, Indiana and Illinois. They say their sales for the summer months have never been so good.

Patrons of the "Big Four" will please note that those holding first class tickets reaching over either the New York Central or West Shore have the privilege of going by steamer from Albany to New York if they so desire.

The Cleveland (Tenn.) Fire Brick Co. announce that they have enlarged their plant to a capacity of 20,000 brick a day. They own large beds of fine fire clay and if the demand requires it will increase their capacity still more.

The attractions of a trip to Mackinac Island via the Detroit & Cleveland Steam Navigation Co., are unsurpassed. It only costs about \$13.00 from Detroit, or \$18.00 from Cleveland, for the round trip, including meals and berths.

The Livingston Fire Clay & Brick Co., Livingston, Mont., are investigating machinery, etc., with a view of erecting large fire brick works. They have a fine quality of fire clay they think and plenty of it and propose to erect a model plant.

The firm of Chisholm, Boyd & White, of Chicago, have found it necessary to largely increase their working capital in order to keep pace with their rapidly increasing trade and have therefore incorporated under the name of the Chisholm, Boyd & White Co., with capital stock of \$400,000 fully paid. The management of the business will continue the same as heretofore.

The San Joaquin Brick Co., of Stockton, Cal., write that they have put up a Hoffmann Continuous Kiln at considerable expense and are just burning the first round quite successfully. They intend to burn only common brick in that way and will build some form of square kiln for their pressed brick. They think the down-draft kilns with outside chimneys not suited to their needs.

If you are contemplating a trip to the mountains, lakes, or seaside, ask for tickets via the Big Four Route (C. C. C. & St. L. Ry.), the great tourist line to all Eastern and Atlantic Coast resorts. The "Southwestern Limited," the finest train in America, runs daily to New York and Boston, equipped with through Wagner palace sleeping cars and an elegant din-

ing car service. The entire train runs solid into the heart of New York City avoiding all ferries and transfers. Absolutely no change of cars to Boston.

Owners of Factories Warehouses and other buildings where a fire would occasion irreparable loss are always interested in learning of things calculated to reduce the possibilities of this destroying element. Among other things calculated to render this destroying element inoperative, might be mentioned the Iron Shutter and Door manufactured by the Cincinnati Corrugating Co., of Piqua, Ohio. The company announces that they are fully prepared to fill promptly all orders for this class of material in guages as heavy as 10 or 8 B. W. G. corrugated iron is recognized as one of the best forms for this class of material as the corrugations not only give greater stiffness, but at the same time will prevent warping. If you are interested in this class of material it will pay you to correspond with these people for they have experience and unrivalled facilities.

The Oakland Press Brick Co., of Zanesville, Ohio., write as follows: We have been so very busy of late we hardly knew which way to turn. The demand for our pressed brick has greatly increased and we have been compelled to turn away numerous orders. We have our plant in splendid shape now and the brick we turn out compare favorably with any on the market. Our Griswold patent kilns work admirably and we are getting very handsome results from them. The brick yards here are all doing a flourishing business and have their product about all sold for this season's output. We are blessed with a great variety of fine brick clays in this valley and with an abundance of cheap fuel,—feel well satisfied with our location. The CLAY-WORKER has been of much benefit to us and we read each issue with much interest and must compliment you on the creditable sheet you are now giving us.

How many brickmakers have long suffered in silence the damages caused by the omni-present crowd of hoodlums, who seem to regard the convenient buildings and sheds of brickyards as their legitimate resort for loafing. The Excelsior Brick Co., of St. Louis, Mo., submitted to the outrages of a crowd who infested their yards until the damages resulting from broken brick and scattered tools reached upwards of one

thousand dollars. They then went before the police and made complaint, resulting in the arrest of three of the gang, who have been indicted by the Grand Jury. The others have not been captured, but the police are after them, and they will probably have an early opportunity to use up their surplus energy breaking rocks, rather than bricks. Another outrage was the attempt of some unknown incendiaries to destroy the buildings at Anthony Ittner's brickyard on California Ave., on the morning of July 4th. A box containing a lot of gunpowder, covered with shavings saturated with coal-oil was placed in a large clay shed, and two long fuses were set and lighted. Owing to the timely discovery of the "infernal machine" by an employe, the plan failed of success. Suspicion points to some recently discharged hands, and if a case can be made against them, they will be made to suffer.

PAVING BRICK.

Manufacturers of paving brick will find the little 48-page book entitled "Durability of Paving Brick" a very valuable aid in introducing brick in localities where, from lack of information, the value of brick as a paving material is questioned by those in authority. It is an authentic statement of the comparative merits of the principal paving materials and proves conclusively that brick is equal or superior to all others. It should be distributed generally by those interested in advancing the paving brick interests. Price of single copy 25 cents. Special rates will be made to manufacturers ordering large lots for distribution. Address the publishers, T. A. Randall & Co., Indianapolis, Ind.

NEW INVENTIONS.

The following is a list of patents appertaining to brick, tile, terra-cotta, sewer pipe, pottery, etc., and the machinery used in their manufacture, issued since our last number.

- 454,780. Dry Clay Grinding Machine—John Thompson, Bucyrus, Ohio.
- 455,039. Brick Kiln—Walter P. Grath, St. Louis, Mo.
- 455,160. Brick Machine—Albert Brooker, Lancaster, Wis.
- 455,374. Brickmaking Machine—Bruce C. White, Chicago, Ill.
- 455,540. Brick Machine—Horace B. Camp, Cuyagoga Falls, Ohio.
- 455,611. Process of reducing Kaolins and clays to their component oxides—Philip A. Emanuel, Aiken, S. C.
- 455,659. Tile—Fredrick D. Cook, Allegheny, Pa.

VERY GRATIFYING.

JAMES F. CLARK, President. JOHN H. CAMPBELL, Sec'y and Treas.

OFFICE OF

MICHIGAN BRICK AND TILE MACHINE CO.,
Manufacturers of

CLAYWORKING MACHINERY.

(Copy)

Publishers of the *Clay-Worker*:

Enclosed we hand you copy of "ad." for the July number of the CLAY-WORKER.

We are more than pleased with the CLAY-WORKER as an advertising medium. Our "ad." in it this month has sold our "Special No. 6 Curved Side Cut Cutting Table, "Patented Process," in New York, Illinois, Kansas and North Carolina. Also a complete outfit to Messrs. Kime & Kime, at Fort Dodge, Ia., which we will ship this week. They have an elegant bank of clay and a good market, and intend to make a specialty of fine building and paving brick, for which their plant is specially designed. Our June trade has been extremely satisfactory, for which we wish to thank the CLAY-WORKER. Wishing you success, we remain, Yours truly,

JOHN H. CAMPBELL, Sec'y.

Morenci, Mich., June 29th.

GOOD EVIDENCE

From Disinterested Witnesses Regarding Stewart's Diurnal Kiln.

We give the following quotations from letters in our possession.

"Altogether it is the best burn I ever had, with twenty-four years' experience. The tile are all well burned and none spoiled by the fire. I am very well pleased with the kiln. I know I can burn in one-third of the time formerly taken, with two-thirds of the fuel, and not one-tenth of the damaged tile."—B. F. Peck, East Bethany, N. Y.

"The kiln works nicely and good, and we want no better. It is all you claim for it.—O. Martin & Sons, Greene, Ind.

"Have burned one kiln; burned 30 hours; the top was very hard, but as far as we have emptied have found no warped or melted tile."—Ashberry Hinkle, burner for Miller Brown, Santa Fe, Ind.

"Have burned one kiln. I believe the kiln is all, or even more than you claim it to be."—J. C. Thackery, Urbana, Ohio.

"Have burned one kiln. Am very much pleased with it. The fact is, it could not be improved. Can scarcely tell by the looks of the tile what part of the kiln they came from—hard as flint. I burned longer than I expect to next

time—was but a little more than half I gave my old kiln."—C. D. Rowe, Ridgetown, Ontario, Canada.

We add: Should any of our kilns burn the top too hard, restrict the draft by shutting the doors closer. If too hard on the bottom, give more draft until the desired shade is obtained from top to bottom.

CANADIAN READERS

will bear in mind that we now have a patent on our kiln in Canada.

STEWART BROTHERS,
Mt. Victory, Ohio.

A FINE RECORD.

C. PARDEE TERRA COTTA WORKS
Perth Amboy, N. J.

JOHN N. WHITE, Manager. ROBT. W. TAYLOR,
Superintendent.

June 24th, 1891.

MR. W. A. EUDALY,
Cincinnati, Ohio.

DEAR SIR:—Mr. Calvin Pardee desires me to send you data showing our experience with your down-draft kilns which have been adopted in the new brick and floor tile works here.

The average time of firing is 133 hours, counting from the time of lighting the fires until the daubing up of furnace doors.

The consumption of coal averages 12½ tons per kiln, which contain 38,000 front brick and sometimes as many as five different kinds in one firing.

I forward a box of these to you showing their hardness, line, and texture or toughness. This last quality we consider very essential, as masons experience difficulty and waste in cutting hard burnt brick if brittle. The clear color of the buff and grey brick is very gratifying, obtained as it is in the same firing with the old gold, speckled and purple brown brick of both Roman and standard size fronts.

Illustrative of the uniform distribution of heat in your kiln, I can assure you that in the firing of the Roman brick, none of which are too pale or too hard, we have less than one half per cent. broken or warped, while with the ordinary size fronts, both in stiff mud and dry press, the loss in chipped and bruised brick is less than four per cent., due partly to faulty setting, which we are overcoming.

The fuel we use is Anthracite of broken size, and bituminous coal, (the proportions of each, varied according to the extent of clear colored, or flashed face brick in the kiln.)

These being the first of your kilns erected in this district, the firemen had trouble at first with the throttle furnaces, but this difficulty has been long since overcome with the results as given above. I am, dear sir,

Yours truly,

ROBT. W. TAYLOR,
Supt. Brick & Floor Tile Dept.

Beginning Carefully.

Editor *Clay-Worker*:

Enclosed please find our subscription to the CLAY-WORKER. Although we have not yet engaged in the brick business, yet we find your journal very instructive and also profitable, as we have several times decided upon certain machinery and then found it was not suitable for our clay. There is a great demand for brick here, there being more buildings erected than ever before at this time of the year. The city is putting in 25 miles of sewer. We expect to have a stock of brick on hand for winter and spring trade.

H. C. HERRON & SON,
Cleveland, Ohio.

\$5--Niagara Falls Excursion.--\$5

The Annual Niagara Falls Excursion via C., H. & D. R. R. will leave Indianapolis Thursday, July 30th, at 10:55 A. M., going via Detroit and Michigan Central railroad, reaching the Falls early Friday morning. Fare for round trip to Niagara Falls \$5.00, to Toronto \$6.00. Tickets good to return 5 days from date of sale. Special rates for side trips to Thousand Islands, etc. Secure sleeping car and chair car space early so arrangements can be made to take care of all. For further information call on or address H. J. RHEIN, General Agent C., H. & D. R. R., Indianapolis, Ind.

KILN PLANS.

A large number of brickmakers are availing themselves of the opportunity to obtain complete building plans of the central flue, round down-draft kiln at a small outlay. The plans and specifications are invaluable as a means of reference, and are worth many times the price asked for them. Address P. Arnold, Supt. Dover Fire Brick Co., Canal Dover, Ohio.

7. 11. d

The village authorities of Avon, Ill., have decided that the kilns belonging to the Bardolph Fire Clay Works located there are a public nuisance, and have resolved that they must be abated. The smoke and gases they claim are injurious to health and property. The town authorities should remember that every rose has its thorn.

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Keeping Up With the Times.

The FREY-SHECKLER Co., Bucyrus, Ohio, are enjoying an enormous trade in their large variety of Clay Machinery; nearly three times as large in January and February as during the same months in any preceding year.

The most notable increase is in Dry Pans, Pug Mills and Auger Machines suitable for making Street Pavers.

It is now fully established by numerous trials that first-class pavers can only be made by an Auger Machine. It is also an interesting fact, that over 60 per cent. of all pavers made in the United States are produced by the Frey-Sheckler Co's. Auger Machine.

It puts more clay in a cubic inch than any other method.

It works clay at just the proper temper to make a uniform, homogeneous brick.

All parts liable to break are made of steel. It makes as many brick in a day as can be taken care of. It has with it, as an essential accessory, the Neidergesaess patent lubricating die, which makes smooth surface, square corners saves power and lamination.

Another new creation that is finding favor with Brick-makers is the new patent cutting table. It is adapted to either side or end cut brick and its capacity fully 20 per cent. above any hand table heretofore used. The column of clay keeps constantly moving, is cut into side or end cut brick whilst in motion, and leaves no fragment to be thrown back into the brick machine.

It is too strong to break and constitutes an important complement to their excellent sets of brick machinery.

The substitution of a short, polished plate with a lubricating roller at each end, for the six or eight rollers that usually carry the column of clay from the die to the cutting table, is also a popular improvement by which the handling and frequent cleaning of the sticky rollers is avoided.

The two rollers really bear none of the burden of the column of clay, but only roll gently on its under side, spreading over its surface a thin coat of crude lubricant which they carry from the oil reservoir in which they run.

The company has several new and improved machines which they will introduce to the fraternity during the summer.

Their clayworking experimental station which they have erected during the past year at Bucyrus, Ohio, at a cost of over \$50,000.00 enables them to thoroughly test their new inventions before sending them to their customers' brickyards.

The interesting 29th Annual Catalogue of the Frey-Sheckler Co., Bucyrus, Ohio, will be sent free upon application.

See ad. on page 91.

THE CLAYWORKER.

VOL. XVI.

INDIANAPOLIS, IND., AUGUST 15, 1891.

No. 2

Written for the Clay-Worker.

EXAMPLES OF AMERICAN BRICK AND TERRA COTTA WORK.

No. 40.

WE present this month a view of a fragment of terra cotta that is of exceptional beauty both in conception and execution. It is one of several beautiful panels made by the Perth Amboy (N. J.) Terra Cotta Company for the Hotel Ponce de Leon at St. Augustine, Fla., one of the largest and finest hotels in America. It was erected by H. M. Flagler, of the Standard Oil Company, and was designed by architects Carrere & Hastings, and is considered one of the most suc-

"I WOULD go on my hands and knees from here to Jerusalem," said a woman once to me, "if I could only be young again!" I looked at her worn and faded face, powdered and rouged in imitation of youth's lovely bloom, at her tired eyes, and the wrinkles that lurked in their corners, at her dress, so youthful, and yet so inadequate to

purple cliff—and that is youth. Next the opulent life of our prairies, teeming with golden plenty—and that is early middle life. Next, the massive plateaus and grim canons of the far West, and that is advanced middle life. And then—the desert! Leagues of dead sand where no green things grow, and no birds build, the terrible monotony of emptiness and nothingness. Does not the desert fitly symbolize dreary old age? What, though, the desert passed, the "Sea of peace" awaits us! We think but of the intervening unloveliness, and shudder at each turn of the wheels that carry us onward in our journey from the eastern to the wes-



cessful pieces of Spanish architecture in this country, the details especially being very elaborate, and are carried out in the most careful and artistic manner. The walls of the building are made of cocina, a mixture of cement and shells from the seashore, and trimmed with red brick and terra cotta, the whole presenting a most artistic combination. There is a large amount of terra cotta work in the structure, which, as our sketch shows, is well conceived and executed in a manner very creditable to the manufacturers.

conceal the ravages of time upon what was once a faultless figure, and involuntarily the tears filled my eyes at this sad fate of humanity—so common to us all. For, let those deny it who may, everybody instinctively dreads to grow old. When the life clock strikes fifty, every year thereafter that is told off on the relentless dial, bears a keen and certain sting. Life is very much like the overland trip across our continent. First the hill scenery of the East, with winding streams and fertile valleys, wildwood brooks, sudden vistas of fretful fell, and

tern shore. Certain it is that no mere cultivation of physical graces can avail us long. Even the culture of the intellect, will not assure a comfortable passage through the devastation of desert years. In the cultivation of those qualities, that make us lovely in temper, gracious of speech, pure in heart, and unworldly, are we insured the victory over the future that awaits us. Stop powdering then, and buying wrinkle lotions, set not your dependence upon wigs and furbelows, but seek to forget self in gracious memory of others, then

shall you make the desert blossom like the rose and rob the last stage of life's journey of its terror and its gloom.—*Amber in Chicago Herald.*

Summer Time.

When I start my plow a-runnin' in the black and meller ground,
And the land is growin' smaller that my horses tramp around;
When the white oak-buds are openin' and the grass a-growin' green,
Makes a feller think of summer as he gazes on the scene;
When the chipmunks runs and chatters, 'cause the plough his den 'as torn,
An' the crows are lowly scoldin' 'bout the plantin' of the corn;
When the bluebirds hollers out a rail and starts to build a nest
Then I think that that's the time o' year I kind o' like the best;
But it's mighty nice, I tell you, when the summer time is here,
With the wheat a-growin' yellor and the harvest growin' near;
With the timothy in blossom an' the hayin' just at hand,
An' the mother quail a-callin' to her peppin' little band.
Oh, I like to watch the wooly clouds a-floatin' far away
As I'm riding on the mower or rakin' up the hay.
Then I somehow seem acquainted with each bird or bumblebee.
An' I think the golden summer is the time o' year for me.
—*Ohio State Journal.*

(Copyrighted.)

DURABILITY OF BRICK PAVEMENTS.

BY IRA. O. BAKER, C. E.

TABLE III gives the results of the abrasion tests of stone. The pieces of stone were approximately the size and form of the bricks tested. For reasons similar to those stated in discussing the abrasion tests of brick and because in working out the stone specimen the tool used probably deadened the surface of the stone which would cause it to wear off more easily, the results for the loss during the first half hour are not suitable for use in making comparisons. Taking an average of all the stones in Table III and calling the loss during the third half hour unity, the loss during the second is 1.18 and the loss for the first is 1.96. Three samples of each stone were tested, except that only one sample of Nos. 4 and 5 were used.

All the granites except the first are samples from the street pavements of Chicago. The identification of the pieces were carefully checked. The marble, sandstone, and limestone—samples of well known stones of uniform texture—were included to afford other experimenters further means by which to compare the abrasion of their bricks with

those tested as above. Attempts were made to secure other well known stones, but such efforts have thus far failed.

amount each kind of brick lost during the third half hour by the loss of each kind of stone during the same

TABLE III.

RESISTANCE OF STONE TO ABRASION.

Ref. No.	Kind.	Locality.	Loss in per cents. of the original weight during			Total loss during	
			1st half hour.	2nd half hour.	3d half hour.	1st, 2nd and 3rd half hours.	2nd and 3rd half hours.
1	Granite	Quincy, Mass	1.5	0.8	0.4	2.7	1.2
2	Granite	Aberdeen, Wis	1.1	0.7	0.3	2.1	1.0
3	Granite	Martindale, Wis	0.6	0.4	0.3	1.3	0.7
4	Granite	Berlin, Wis..	0.4	0.1	0.03	0.5	0.13
5	Granite	Iron Mountain, Mo..	2.2	0.5	0.4	3.1	0.9
6	Light Cloud Columbian Marble.....	Rutland, Vt	4.4	3.1	2.9	10.4	6.0
7	Drab Sandstone	Berea, Ohio..	9.8	6.1	5.4	21.3	11.5
8	Dolomitic Limestone	Ellettsville, Ind	8.6	5.6	4.9	19.1	10.5

RELATIVE RESISTANCE OF BRICK AND STONE TO ABRASION.

§ 10. Table IV exhibits the loss of the several grades of bricks in terms of the

time. For example, the loss of brick No. 1 during the third half hour, as given in Table II, was divided by the loss of Quincy Granite during the third half

TABLE IV.

RELATIVE RESISTANCE OF BRICK AND STONE TO ABRASION.

Ref. No.	Selected by	Locality.	Wear of the Brick in Terms of that of							
			Granite from					Columbia Marble	Berea Sandstone.	Indiana Lime'ne
			Quincy.	Aberdeen.	Martindale	Berlin.	Iron Mt.			
1	B	A1	2.0	2.7	2.7	27.	2.0	0.3	0.1	0.2
2	B	A2	6.5	8.7	8.7	87.	6.5	0.9	0.5	0.6
3	B	B1	1.8	2.3	2.3	23.	1.8	0.2	0.1	0.1
4	B	B2	5.0	6.7	6.7	67.	5.0	0.7	0.4	0.4
5	B	B3	6.2	8.3	8.3	83.	6.2	0.9	0.5	0.5
6	M	C	1.0	1.3	1.3	13.	1.0	0.1	0.1	0.1
7	M	D	7.5	10.0	10.0	100.	7.5	1.0	0.6	0.6
8	M	E	3.2	4.3	4.3	43.	3.2	0.4	0.2	0.3
9	M	F	4.8	6.3	6.3	63.	4.8	0.7	0.4	0.4
10	B	G1	9.2	12.3	12.3	123.	9.2	1.3	0.7	0.8
11	B	G2	.....	.....	.....	.....	.....	.....	.....	.....
12	M	H1	3.0	4.0	4.0	40.	3.0	0.4	0.2	0.2
13	M	H2	3.0	4.0	4.0	40.	3.0	0.4	0.2	0.2
14	B	I	1.2	1.7	1.7	17.	1.2	0.2	0.1	0.1
15	M	J	2.5	3.3	3.3	33.	2.5	0.3	0.2	0.2

loss of the several stones—all being tested under the same conditions.

Table IV is found by dividing the

hour as given in Table III and the result placed in Table IV opposite No. 1 in the column headed Quincy Granite.

Since the quantities of Table II and III are possibly in error nearly a half unit in the last figure, the last figures of the quantities in Table IV can not be relied upon. However, this limitation does not materially alter the value of the table. Of course a similar table could be prepared for any other half hour or any combination of these experiments.

To compare any given brick with those of the above tables, it is only necessary to secure samples of any of the stones in Table III, and test both brick and stone under conditions nearly similar to those here employed as can be readily obtained. Then deduce a table similar to Table IV, and a comparison between these results and those of Table IV will show the relative resistance of the brick being tested as compared with those in the above table. By this means the qualities of any new candidate for public favor can be compared with an absolute standard, as say, Quincy Granite, and also with any of the above brick—all of which are of demonstrated good quality.

§10a. The following data on the resistance of paving brick to abrasion and impact came under the writer's eye after this article was supposed to be completed. The experiments were made by Mr. Geo. Sattler, of St. Louis, about twelve years ago. The data from which Table V was computed were taken from a printed copy of a communication of engineers and citizens of the Board of Public Improvements of St. Louis, relative to brick as a paving material.

The experiments were made by "inserting into a tin can having perforations all over it, 960 grains (2 oz.) of each of the materials, in pieces of equal size, and shaking them many thousand times, and freezing and thawing very frequently," after which the amount remaining in the can was weighed. "These residues, therefore, represent the relative resistance of the several materials to *impact* and *abrasion*. It will be seen that in this test the bricks of Mr. Sattler stand close to Missouri granite. We give this experiment upon the representation of Mr. Sattler, and have on doubt of its correctness, the case containing the residue having been sent here and, after an examination of the contents to verify the respective weights, handed to the Board for its inspection and consideration."

RELATIVE VALUE OF THE TESTS.

§11. In the first part of this article has been described a method of testing brick to determine the transverse

strength, the absorptive power, the specific gravity, the crushing strength, and the resistance to abrasion and impact. It now remains to discuss the relative value of the several tests. Or, in

would show the relative quality of the different bricks. But the several tests are not of equal value. In the first place, owing to difficulty in them the experiments on compressive strength are prac-

TABLE V.
RELATIVE RESISTANCE OF BRICK AND STONE TO ABRASION AND IMPACT.

Ref.No.	Kind of Material.	Loss in grains.	Loss in per cent. of original weight.	Loss of the different materials in terms of the loss of		
				Lake Superior Granite.	Missouri Red Granite.	Asphalt Concrete.
21	Lake Superior Granite.....	120	12	1.0	0.4	0.14
22	Sattler's hard-burned brick.....	180	19	1.5	0.6	0.21
23	Missouri red granite.....	320	33	2.7	1.0	0.38
24	Sattler's hand-made brick.....	324	34	2.7	1.0	0.38
25	Sattler's hydraulic pressed brick.....	333	35	2.8	1.0	0.39
26	Best St. Louis Limestone.....	667	69	5.6	2.1	0.79
27	Asphaltum concrete.....	847	88	7.0	2.6	1.00
28	Sterling's side-walk brick.....	890	93	7.4	2.8	1.05

other words, having tested a number of bricks as above, how may we determine which of the several bricks are the best? If the five tests were of equal value, the result could be easily arrived at as fol-

lowing. In the second place, absorptive power and specific gravity depends mainly upon the same quality, *i. e.*, porosity. The value of the absorptive test varies a little with the climate;

TABLE VI.
RELATIVE RANK OF THE SEVERAL BRICKS IN THE VARIOUS TESTS.

Ref. No.	Selected by.	Locality.	Transverse Strength.	Absorptive Power.	Specific Gravity.	Crushing Strength.	Resistance to Abrasion.	For All Tests		For 1st, 2nd and 3rd Tests.	
								Sum of Ranks	Final Rank.	Sum of Ranks	Final Rank.
1	B	A1	3	5	6	1	3	18	3	11	4
2	B	A2	11	10	9	7	9	46	10	30	10
3	B	B1	6	2	2	2	2	14	1	10	3
4	B	B2	9	7	7	3	7	33	8	23	8
5	B	B3	4	6	5	4	8	27	6	18	7
6	M	C	5	1	2	10	1	19	4	7	1
7	M	D	8	9	8	8	10	43	9	27	9
8	M	E	7	3	4	9	5	28	7	15	5
9	M	F	2	8	3	5	6	24	5	16	6
10	B	G1	10	11	10	11	11	53	11	32	11
12	M	H1	1	4	1	6	4	16	2	9	2

lows: From a table similar Table I, except that instead of giving the results as in that table give the rank which the bricks have in the several columns of that table. Table VI is formed in this way. Notice that Nos. 11, 12, and 14 are omitted because the record for them is not complete.

If the several tests had equal value, then the number in the third column from the right hand end of Table VI

that is, in a cold climate the absorptive test is of relative greater importance, and in a warm climate of less. The properties that give a great resistance to abrasion are the ones most to be desired in a paving brick; but abrasion tests are not accurate as tests of absorptive power and of transverse strength, and besides the transverse strength shows one quality, *i. e.*, toughness, which largely determines the resistance to abrasion

and impact—particularly the latter. As far as the writer can see, the tests for transverse strength, absorptive power, and resistance to abrasion are of nearly equal value. The last column of Table VI shows the rank for the three most valuable tests.

SPECIFICATIONS FOR PAVING BRICK.

§12. Bricks vary greatly in size and quality, and hence as a mere matter of business prudence it is necessary to have some standard by which to judge of the quantity and quality of material furnished. As far as the writer has observed, to the so-called specifications for paving brick really specify or define nothing. For example, a very common specification is: "The brick must be of the best quality, hard-burned paving brick." Such a requirement puts the manufacturer or contractor at the mercy of the one to whom is given authority to interpret the contract and inspect the material; while the citizens have no definite idea of the quality of brick being used. Practically such a provision is usually a dead letter.

The most definite specifications for this purpose that the writer has seen are the following: "The paving brick shall consist of the best quality of sound, hard-burned paving brick, made and burned specially for street paving purposes; and shall stand all reasonable tests as to durability and fitness, to which paving material is usually subjected. All bricks shall be square edged and straight, free from cracks and other defects, and of uniform size, and of a quality to be approved by the Board of Public Works. Three or more bricks of the kind or quality of bricks proposed to be used in the paving shall be furnished with each proposal, the bricks to be labeled with both the bidder's and maker's name and address, and be deposited in the office of the Board of Public Works before the time of opening the bids." Not infrequently a clause is unwisely inserted requiring that the brick shall be burned in a particular kind of a kiln. The user of any commodity should simply specify the qualities desired and leave the manufacturer untrammelled in his method of securing that quality.

The latter specifications are better than the former, but do not specify much as to the quality of bricks to be employed. The fact that a brick is locally known as "the best quality, hard-burned paving brick" is no indication of its quality. A brick called hard in one

community, in another may be called soft. In recent years there has been reported a great difference in durability of brick pavements, varying mainly with locality. Probably this difference in durability is due to the difference in the quality of the brick. It is impossible from the description of the brick as usually given, to get any definite idea of the quality of the material employed.

In the variability of the product, the manufacture of bricks and hydraulic cement are very much alike. All engineers in using hydraulic cement are careful to specify not only the conditions which the cement should fulfill, but also the method to be employed in testing whether these conditions are fulfilled. Further, it is unquestionably true that the specifications for hydraulic cement employed by some well-known engineers have done more to improve the quality of hydraulic cement than any other one thing. If brick is to hold its own and grow in public favor as a paving material, it will be necessary to take advantage of all the teachings of science and experience.

One of the points that needs attention in this connection is the establishment of a standard by which to judge of the suitability of any particular brick as a paving material. It is bad business policy for the manufacturer of paving brick to even allow the public to delude itself as to the service to be derived from a particular quality of brick when laid in a pavement. In fact the principal danger in the rapidly increasing use of brick as a paving material is that brick made in the neighborhood will be employed in response to local influence and to the popular cry of helping a local industry, without due regard to the quality of the brick. Hence the manufacturer should be interested in establishing a recognized standard for paving brick. There is a recognized standard for the material employed in all other branches of engineering. For example, in iron construction the quality of the material, and even the details of the experiments by which this quality is to be determined, are rigorously specified.

Definite specifications are in advantage to both parties to a contract. If the provisions of the contract are loose, one contractor will interpret them one way and put in a bid that can be fulfilled profitable only by using inferior material, while another contractor will interpret them to require first-class material and will bid accordingly. Again, another con-

tractor not knowing the kind of work expected under the loosely drawn specifications, bids at such a price he can put in first-class work, if it is called for, and takes his chances of being able to satisfy the specifications with work of lower quality. Or, taking another point of view, a committee of the city council visits a number of cities to inspect brick pavements, and being well pleased with what they saw order their own streets paved with "hard-burned paving brick," and make no adequate provision to determine the quality and probable durability of the brick employed. With the exception of railroads, the paving of the streets of cities represents a larger outlay than any other class of public works. Hence the public should be interested in the establishment of a recognized standard for all paving materials. The above experiments were undertaken to determine some absolute standard by which to judge of the quality of paving brick.

§13. With Tables I, IV, and VI before the engineer, he can draw definite specifications for paving brick. For example, it would be difficult to conceive of a better paving brick than No. 6. They are truly first class. They are on the market in practically unlimited quantities, and, to the writer's personal knowledge, of apparently as good quality as the samples tested. If this quality is desired, it is only necessary to specify, among other obvious simple conditions, that three (or five) samples taken at random and tested as above shall show a modulus of rupture of 1,600 pounds per square inch, an absorption of 1.5 per cent., and the same loss by abrasion as Quincy granite (or the corresponding quantity for any of the other stones) when both are tested under the same conditions.

If a second quality, but by no means a poor, paving brick is desired, make the specifications agree with the tests of No. 3 or 12—the two are practically the same;—that is to say, specify that the modulus of rupture shall be 1,400 pounds per square inch, the absorption shall not exceed 4.0 per cent., the loss by abrasion shall not exceed two times that of Quincy granite.

For a third class brick specify the qualities shown by No. 10; that is, specify that the modulus of rupture shall be at least, 1,200 pounds per square inch, the absorption 6 per cent., and the loss by abrasion shall not exceed 6 times that of Quincy granite.

In applying these specifications, it will

be necessary to establish a limit below which no brick shall go. For example, the above specification for first-class brick says that the modulus of rupture of three specimens must average 1,600, but it would not be premissible for one to be 600. The writer suggests, *tentatively*, that if the averages specified above are maintained that a variation of, say, 20 per cent. below those quantities be permitted.

§14. There are two other items that need consideration in drawing specifications for paving brick. The first is size. A brick is popularly supposed to be 8 inches by 4 inches by 2 inches; but as a matter of fact while nominally of these dimensions they differ considerably therefrom. An apparently slight difference is of greater importance than at first thought it seems. For example, if reckoned according to cubic contents, brick 8x4x2 inches is worth \$10 per thousand, and brick $8\frac{1}{4} \times 4\frac{1}{4} \times 2\frac{1}{4}$ is worth \$12.33 per thousand, and $8\frac{1}{2} \times 4\frac{1}{2} \times 2\frac{1}{2}$ is worth \$15 per thousand. Paving "blocks" much larger than common bricks are sometimes made.

The second of these items is: The clay from which bricks are made frequently contains limestone pebbles, which in burning are changed to caustic lime. Any considerable amount of lime in paving brick is injurious, since a small quantity of water reaching the lime will cause it to slack and disintegrate the brick. Hence it should be specified that the paving brick should not contain enough lime to cause them to crack when immersed in water for, say, 5 or 10 days.

(TO BE CONTINUED.)

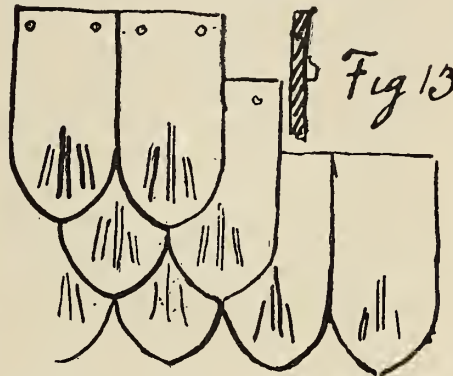
Written for the Clay-Worker.

ROOFING TILES.

SINCE writing my last article on the subject of tiling I have made many trips outside of Paris and studied carefully many details of building under the varying conditions of city, town and country requirements. It is true, however, that nothing which has come to my view has been of more interest than the subject of tile roofing. I have always had a strong feeling for that kind of roof. Primarily, because it is the one roof covering which has stood the test of time. Slate, as any one who cares to investigate may know, is necessarily a temporary covering. It is one which will require regular attention from the time that it is put on. As we all know, it is the worst possible covering that

may be brought in contact with fire. A metal roof requires painting and repainting, hence, constant expense and attention. Shingle roofs we all understand.

A tile roof is the one covering which will stand for years without expense or attention. No one has a right to dispute this. There are not two sides to this question. A tile roof is permanent; other roofs are temporary. This statement cannot be successfully contradicted. History sustains any statement which may be made with respect to the permanent quality of such a covering. History confirms the temporary character of



other roof coverings. A covering which is superior to tile remains to be devised. We may study history and realize the possibilities of a tile roof covering. When we can look back and see a roof which has been in use for five or six hundred years, why concern ourselves?



Why look for something better? Five or six hundred years is long enough. It is not much per square per year. So much for tile roof covering. Bring up some other roof and expose its history. Some of my friends will say: "How about the lead roofs of the old cathedrals?" A lead roof is, relatively, a short lived roof. Lead contracts and expands in the same direction. That is, it expands in the direction of its slant towards the gutter. When it contracts, it goes in the same direction. It goes the same

way all the time; it crawls. Thus, on some of the old cathedrals we will find a roof with a sheet of lead as thin as paper at the top and very thick and heavy at the bottom of the sheet. The difference between a thickness of paper and no covering at all represents a short lapse of time.

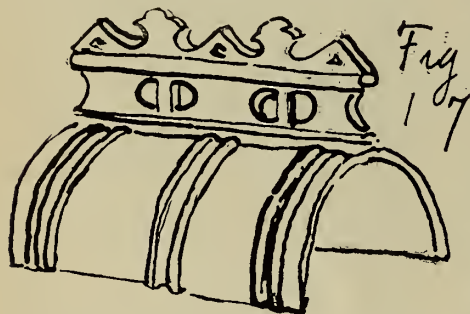
The natural color of a tile roof is red. This color is imitated on our metal and wood roofs. Red always makes a good line against the sky and makes an agreeable complement against the green of a landscape. It is a natural, proper combination. Never offensive, always harmonious. Here we have four or five hundred years of history, proper decorative qualities, good color, harmony with nature, and everything to commend it.

With all this history and all that is desirable, why have we not more tile roofs in America? Because the tiles are not made. There is a yawning, gaping market and no supply. Once in a while we hear of some one out in the country who has invented a tile covering. He has a patent on it, talks about what it will do, organizes, or tries to organize a company. The success is more or less indifferent. People get tired and quit. Why does not the roof succeed? Because the gentleman from the country does not know how to make a tile roof, does not know the form to give his tile, does not know what it will do, does not know the history of tile roofing, except in a general way, and altogether is not fitted for doing business. He merely has someone's money invested in it. But money does not make the mare go. It is intelligence; it is the know how. The man who knows how to make a tile roof, who knows a little about its history and has only a little money is sure to make a great fortune. All he has to do is to make his tiles and get paid for them. People are sure to want them if he can make them and make them right. He can make them right if he looks around him. The thing which has been successfully done for eight or nine hundred years he ought to be able to do to-day. There is hardly a patentable improvement on a tile roof. A man may get a combination patent on a blue headed screw in combination with some other non-essential feature and brand "patent" on his tile. But, taking it altogether, the patent is not worth anything and is capable of utter obliteration. Patents on tile roofing are a good deal like many other patents, not worth the pretty paper on which they are printed,

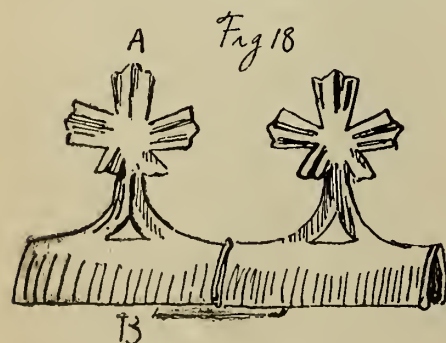
to say nothing about the pretty ribbon and the red seal that goes with them.

While this is not a technical matter in the strict sense, I believe that a few luminous, argumentative statements are quite as necessary in connection with the manufacture of tile roofing as detailed facts.

In resuming the path that we were traveling last month, I call attention to Figure 12. Anyone who pays some attention to the history of architecture and the history of design in general, may understand that a pattern like this is a



perfectly natural outcome of those that preceded it. While it is less ornamental than some of the round cover tiles, it is well to bear in mind that the cover tiles were not constructed in that form for reasons connected with ornamentation. That form was developed constructively and for reasons entirely disconnected with beauty. All this is true notwithstanding the fact that the round cover tiles are the most beautiful that have



been made. Such tiles were illustrated in the first article of this series. I say, notwithstanding the fact that they are more beautiful, they were not designed for that particular purpose.

In Figure 13 we have a form which was developed for the sake of its peculiarity, while in Figure 12 of the last number we had a tile in which the corners were merely clipped. We have one here in which they are rounded off, an effected form, one which in the mind of the designer had the idea of beauty

attached to it in connection with the unusual. The section of this tile shows the manner in which it was provided with a shoulder which rested against a sheathing covering of the roof. This tile was used at and after the end of the twelfth century. After this, down to the fourteenth century we had mere variations of form—very little that was radical in its constructive detail. At the present time the tiles which are in general use on nearly all buildings which have not flat roofs, have short lap patterns. These in their manifold details will be illustrated fully in a subsequent number. For the present it is well to say something about copings.

We have been accustomed to use certain patterns of conventional form, which have come to associate themselves as the fixed and regular thing for all hips and ridges. However, a little glance at the sketches presented herewith will show clearly enough what is possible in this connection. At the same time it is well to understand that this is a mere step outside of the usual run of such things and shows what is possible in endless variety. No. 15 is a simple, neat, inexpensive pattern, which, with the ornamental detail, would present a quaint and picturesque appearance. No. 16 is but a variation of the same idea. No. 17, a step in the direction of complication. No. 18, a very beautiful artistic design, suited for a large imposing structure. Patterns of the style of No. 14 and 15 may be used for ridges as well as hips. If No. 18 is used for hips the direct vertical axis of the decorative parts should be maintained, so that no matter what angle the hip may take the line from "A" to "B" would always be directly vertical.

It is generally supposed that a hip and ridge pattern should be of different design. This is altogether unnecessary. A very harmonious and quiet effect may be secured by using the design for both.

LOUIS H. GIBSON.

Paris, June 23, 1891.

The reputation of being a large advertiser is accepted by the public as indicating the possession of large capital. This is not always the case; but in estimating the financial condition of a man the fact of his doing considerable advertising is usually regarded as a point in his favor. This is one of the many usually inconsidered trifles that go to make advertising a profitable investment in the long run.—*Ex.*

Written for the Clay-Worker.

THE FUEL QUESTION.

No. 10.

SPECIFIC AND LATENT HEAT CONTINUED.

DEAR WILL:—In my last I gave you a short table of specific heats, and I want you to bear in mind that it has reference to equal *weights*, not to equal measures—one pound of each substance being generally taken.

It is also of the utmost importance that you discern and understand properly the difference between *quantity* and *intensity* of heat. I have pointed this out before, but I think it will bear repetition, especially with the student to whom specific and latent heats are only newly introduced. The information, therefore, supplied by the thermometer, is the *intensity* of the heat; it tells us nothing of *quantity*, the balance or scales assists us to this when the thermometer has shown the intensity or temperature of any substance.

Now, if you have followed me closely, you will see the utility of a good table of specific heats and will copy and collect as good a table as you can; in doing this, get as much as possible from modern authorities, as they have the advantage of greater accuracy, from the use of more perfect apparatus in obtaining these heats.

You may experiment roughly with a great number of substances yourself; in doing so, however, do it with a view to corroborate as nearly as possible the numbers in your table, and to fix firmly in your mind all the facts you can relating to specific heat. In experimenting with liquids you will find that if you take equal weights of a liquid at different temperatures and mix them you will get the *arithmetical mean* of the temperatures; for instance, take one pound of water at 32° and one pound at 212° and mix them thoroughly, and you get two pounds at 122°. In the same way mix mercury with mercury, or oil with oil, and you get the same result, viz., the arithmetical mean of the temperatures, but if you mix different liquids you obtain very different results. Thus, if we add one pound of mercury at 212° to one pound water at 32° we obtain not mercury and water at 122° but at about 38° only, the water having been heated about 6° higher while the mercury has been cooled down 174°, yet the actual gain and loss in the mercury and water are equal, or balance each other exactly. Now reverse the operation and pour one

pound water at 212° on one pound mercury at 32° and see the result; here we find the order of things reversed, and now we have one pound mercury and one pound water at 206°; the mercury has been raised 174° and the water has only been lowered 6°; the exchange in this case has also been equal. You may very likely object to the comparison on account of the difference in bulk of the water and mercury, the former being more than 13½ times the bulk of the latter. Very well. Now take one pint of water and two and one-eighth pints of mercury and you will find that these volumes take up equal quantities of heat, and one pint of water at 212° poured on two and one-eighth pints of mercury at 32° will raise it (the mercury) to 122°, the water being lowered also to 122°. Or two and one-eighth pints of mercury at 212°, if poured on one pint of water at 32°, will raise the water to 122° and lower the mercury to the same temperature. This, I think, is sufficient to show that volume does not account for specific heat; however, other examples are not wanting, for tin and zinc have nearly the same specific gravities, and, consequently, equal weights have nearly the same volumes, but the specific heat of zinc is nearly double that of tin. Again, take bismuth and gold. Now the specific gravity of gold is nearly double that of bismuth, which will make the volume of gold only half that of bismuth, yet their specific heats are nearly the same. Lead and platinum stand in the same relation to each other as bismuth and gold. Bismuth, I may just tell you, has the lowest specific heat of anything known, except, perhaps, thorium, a very scarce metal and not very well known.

Now, taking the tin and zinc, say one pound of each, and heat them in linseed oil up to 500° F., then drop them in separate pints or pounds of water at 32° and you would naturally anticipate that each pint, or pound, of water would be heated to the same temperature, but you will find a great difference, for while the zinc will only increase the temperature of the pint of water into which it is put from 32° to about 73°, the tin will come far short of even this small rise, for we find it only increases its pint of water about 25°, or, from 32° to 57°. Thus you see the zinc and tin are about the same volume, are the same weight, and the same temperature, yet their power of heating the water is in the ratio of 41 to 25, and that they will only

produce so small a rise, is owing to their limited capacity for heat, or, as we would say, their low specific heats.

From what has been stated above you will have a tolerably good idea of the method practiced for obtaining the specific heats of various substances, and you can, if you wish do some very instructive experimenting in a rough and ready manner, you will easily see why the zinc and tin were heated in linseed oil in the above experiments, because this method of heating them insures the same temperature for both without the least anxiety about their melting, or varying. Now what are we to learn from all this? Well, in the first place, if it is something that cannot be reduced to practice it will not avail us very much, but this in a great measure depends on ourselves; we can reduce to practice a great deal if we are inclined. A knowledge of the specific heats of metals and their melting points gives us the key to a knowledge of the fuel required for heating and melting those metals; for example, take antimony, zinc and lead. First, antimony, with melting point 810° and specific heat .05077. If we divide unity, or 1 by this specific heat decimal we arrive at the fact that this dividend represents the number of degrees a thermal unit will raise 1 pound of antimony, which we find to be 19.70 for $\frac{1.00000}{.05077} = 19.7$, then if we divide 810 by this 19.7 it will give us ($\frac{810}{19.7} = 41.2$) the heat units that will raise antimony (1 lb.) to 810° or melting point, which we find to be 41.2 heat units. Now we will estimate for zinc in the same way, melting point, say 745°; specific heat .09555; now dividing unity again this time by .09555, (or $\frac{1.0000}{.09555} = 10.45$) we get 10.45° that one pound of zinc will be raised by one thermal unit and the melting point 745° divided by 10.45 (or $\frac{745}{10.45} = 71.2$) gives us the thermal units required to raise one pound of zinc to the melting point, which we find to be 71.2 thermal units. Now for lead with melting point 630° and specific heat .0314; here again unity must be divided by the specific heat decimal thus, $\frac{1.000}{.0314} = 32.16$, and the melting point, $\frac{630}{32.16} = 19.58$; 19.58 then are the heat units required to raise one pound of lead to melting point.

The specific heat numbers represent rigidly the proportions of fuel required in each case to raise the metals a certain number of degrees and shows very plain-

ly that lead may be heated any number of degrees—keeping below melting point—with one-third the fuel that would be required to heat zinc through the same number of degrees, and a little more one-half the fuel required to raise antimony through the same number of degrees or to the same temperature.

I have chosen these three metals as affording a good contrast with each other, but the contrast is still more marked if we compare them with water, which you remember has a high specific heat, viz., 1,000, for water requires 10.45 times the fuel that would be needed for the same weight of zinc, and 19.7 times the quantity requisite for antimony, and 32.16 times the quantity required for an equal weight of lead. Of course you understand that these quantities of fuel are the theoretical quantities, and, when reduced to actual weights, are so small that the statement appears too absurd to be accepted, for when I tell you that 739½ pounds of cold lead may be raised to the melting point with the heat of one pound of coal, I am prepared to excuse you if you look upon it as simply ridiculous; as some of my brick manufacturing friends have done with the statement of the theoretical quantity of fuel required to burn a 200,000 kiln of brick, as set forth in the CLAY-WORKER for July, and the following is the sum and substance of a dialogue that ensued.

Brick Manufacturer—Can you burn 200,000 bricks with 8½ tons of coal, or can you teach us how to do it?

Hydro-Carbon—I must confess my inability to do it, or to teach you, as it pertains to a point of perfection that cannot be reached.

B. M.—Then what is the good of such a statement, or why set up an impracticable standard?

H. C.—I cannot do better than use my teacher's reply when he was similarly cornered.

He said: "In giving these figures I do not wish to imply that they will ever be completely realized; but I maintain that in all our operations we should fix our eyes on the ultimate result which theory indicates, which, owing to the imperfect means at our command, we shall never completely realize, but which we should constantly endeavor to approach."

Those few words made a deep impression on my mind long ago, and I think it a good test for the student and practical man to-day. I want you to "read, mark, learn, and inwardly digest" this and kindred paragraphs, then I shall have no fear of you treating lightly, as

of no importance, such subdivisions of the subject of fuel and heat as latent and specific heat, radiation, conduction, and convection of heat, for they all have a large place in the question of fuel economy, in fact these are some of the leakage holes, and the more we know about them the better are we prepared to stop them.

Yours paternally,

HYDRO-CARBON.

HINTS ON BRICKMAKING.

No. 55.

BY R. BRICK.

MANAGEMENT IN BRICK MANUFACTURE.

TO make brick manufacturing profitable, it is necessary to have an abundance of good clay, favorably located in regard to shipping facilities, and a market for the products at a reasonably fair price. This constitutes the foundation for a successful plant. Then the works must be planned and constructed with a view to convenience and economy of power to be used in their manufacture. This refers to muscle as well as steam power. All appliances used should be selected with practical intelligence, selecting all with due regard to their adaptability to the clay to be used, and the requirements of the market to be furnished. All these things are essential to profitable manufacture.

There are, however, other points equally as important. To insure success there must be an intelligent, energetic, practical man at the works all the time, to superintend the making and burning of the brick—one who thoroughly understands the business and who has the qualities of a leader and controller of men—pushing, careful, firm, prudent, and, with all, fair minded—one who can anticipate coming trouble with his men, and forestall it, by taking proper measures before the storm reaches him, and when it comes, the decks are clear, sails furled and anchors ready to drop.

Then there must be a business manager, who looks after the finances. He must sell the product and get the money for same, purchase supplies for the works, and keep the books balanced. Selling and collecting are just as important as proper management at the works; every dollar lost by bad accounts is just that much out of the profits. For instance,

if a bill of one hundred dollars for brick is lost, if the profits are one dollar per thousand, then the profits on one hundred thousand bricks is lost. Think of it! Five hundred thousand pounds of the manufactured product upon which no profit is realized! Better to have the brick than a bad account. Much can be saved by a good buyer in the purchase of fuel, oil, and equipments—one who buys at the right time and the best material. These are self-evident truths, and yet, strange as it may appear, there are many large brick plants in this country that have all the requisites for successful and profitable manufacture except the lack of the right men to superintend the manufacture and manage the finances of the concern. The



W. G. BUSH, BRICK MANUFACTURER, NASHVILLE, TENN.

proprietors were liberal when erecting plant, and equipped it with all modern appliances, spared no expense to get the best to be had, then to save a few hundred dollars a year in salaries they place their great enterprise in the hands of incompetent men. We are dealing with facts and history, not fiction or fancy. The writer visited a large works recently, with a capital of about sixty thousand dollars, with power, machinery and kilns sufficient to turn out one hundred thousand bricks per day, but for want of dry-

ing facilities make less than half that quantity; for lack of proper drainage the dryers are covered with surface water when a heavy rain falls. They are buying bricks from their competitors to fill their contracts, simply for want of competent management. A friend writes me of a fine paving and press brick plant that is shut down and their men thrown out of employment in the midst of the brick season. He says: "They have the purest clay in the country, good machinery, and a whole street of fine kilns." "I think," he says, "the only thing they lack is a competent brickmaker."

Is it easier to raise one hundred thousand dollars to build a brick plant than to get a practical and competent brickmaker to manage it? It would seem to be so. Another large works, with one hundred thousand dollars capital, I call to mind, has been in operation three years, blundering along, making nothing, tearing down this year what they put in last year, and putting up something else that they will change next year. Why is this? They have been trying to make brick without a competent manager.

Let us look at some of the successful and dividend paying brick plants of this country, and what do we invariably find? There are one, or two, or three, energetic, practical men of affairs, at the helm. Just take the trouble to look and you will be sure to discover them. A good brickmaking firm cannot exist without them; they are the vital parts of the concern. Just as well undertake to run a steamboat from Pittsburgh to Cairo without a pilot who is familiar with the river, as to run a brick works with incompetent men to manage it. Some say: "We employed a man who *claimed* to know all about the business." Employ a man of *known* ability, a man who has a record behind him to prove his claims, then you will not err.

If you take up a *Harper's* or *Century* of 1880, says Julian Hawthorne in *Printers' Ink*, you will find very few advertisements, and fewer still that can be termed beautiful. But to-day, if the literary contents of the magazine fail to move you, you may be reasonably sure of find-

ing entertainment in the advertising pages. They are pretty, amusing, and often interesting. And there is good reason why they should be: they represent the outlay of much money and no little brains. If every page of the magazine letter-press were as carefully and nicely constructed as every page of the advertising section, it is not too much to say that American literature might be the gainer.

Written for the Clay-Worker.

GROWING IMPORTANCE OF THOROUGH BRICK BURNING.

BY J. W. CRARY, SR.

MAKING HEAT AND ITS RIGHT USE IN A BRICK KILN.

NOW that the brickmaking season is fairly opened, it is not out of place to consider the most certain and practicable way of producing the very best brick that can be made of the raw material at hand. The steadily increasing demand for a better and larger proportion of thoroughly burned brick, makes it necessary to give more studious and intelligent attention to the setting and burning of brick, than the mere manufacture of unburned brick. The improvements in brick machinery and the manipulation of clays, have reduced the cost of producing *raw* brick to a minimum. Capital and energy will turn out any given quantity of brick, ready for the *setter* and *burner*, very quick and very cheap. But what avails the best economy up to this stage of manufacture, if the same cannot be as surely and uniformly carried out until brick are ready for delivery?

What then are the main points to be considered? I would say, the making of *heat*, the distribution or application of *heat*, and the necessary time, and degree of *heat*, to make brick of uniform hardness, color, and tenacity throughout the brick, and as near as possible throughout the kiln. If we take an average hard brick, found in any of our brick markets, and break it across the middle, we will find two or three shades of color; the darkest shade being on the outside. This shows that the last and most intense heat made in the kiln produced the dark shade, but was not kept up long enough to penetrate through the whole body of the brick. It is evident, therefore, that if the clay shrinks by heat, that the outside part of the brick is more contracted than the inside, and, that although no fractures or cracks are perceptible to the naked eye, yet it is theoretically true,

that the entire surface of the brick is strained and cracked, and hence it is, that brick generally, are easily broken by handling; but when burned throughout, to uniform hardness, and properly and slowly cooled, will stand much rough handling without serious damage.

THE MAKING AND DISTRIBUTION OF HEAT THROUGHOUT THE KILN.

This depends almost entirely on a proper and sufficient draft. The kiln, from bottom to top, should be set loose and uniform, so that the spaces for draft at the *benches* and *overhangers* will have at least six times more opening than the area of the furnace door. If the grates, or furnace door, have an air space of, say, 200 square inches, then the outlet from the *arches* to top of kiln, at any given horizontal line, or course, should be at least equal to 1,200 square inches, over *each arch*; supposing the horizontal area of one *arch* to be 4 ft. 3 in. + 22 ft., the space between brick should be at least one half inch, and the *benches* and *overhangers* should be set *skinlling*, or *zig zag*, and this is better throughout the kiln than the common way of setting the courses transversely, or "three over three," as it binds the whole kiln together, and gives a more free and clear draft, and better distribution of heat; which is not only of the first importance in water-smoking a kiln, but equally so in getting up and diffusing the necessary heat to burn a kiln.

WATERSMOKING SHOULD BE DONE CHIEFLY BY HOT AIR.

If there be a good, strong draft, a very moderate fire will heat the air as hot as it should be, (which should not exceed 200° F.), until the watersmoke is seen light and flashy on top of kiln; then the heat should be increased to a *bright red*, and kept steadily at that until it can be seen all over the top of the kiln, then the arches should be heated to all they will stand without melting; and this heat should be kept up until it appears all over the top of kiln. For further instructions, I refer the reader to my book on "*Brickmaking and Burning*", on sale by CLAY-WORKER.

THE IMPORTANCE OF THOROUGH BRICK BURNING.

If brickmakers expect to succeed they must bring up the entire process of manufacture to a uniform standard of completeness and perfection, like that of all other manufactured articles of commerce. What would a *hardware* dealer think of a lot of edge tools offered to him, all beautifully designed and pol-

ished, but the steel so imperfectly tempered that not one tool in ten would hold a good edge? And yet the common brickmaker will insist that this brick is *hard*, and first-rate, if they have a sort of *ring*, and a color that shows that they have been in a hot fire on the outside. Where is the wisdom or good policy in getting a good brick machine, and a good clay bed, and a good location, and everything favorable for successful brick-making, excepting intelligent, efficient skill, in *setting* and *burning* the brick? But, says the common brickmaker, "I can sell all the brick I can make, *builders* will take anything that will make a wall, provided it is cheap, and the investor don't care, if the builder works cheap, and makes a good show of skill on the outside." This is, no doubt, too true, but now the architects, builders, investors, and the insurance companies, and the tenants, and the building inspection laws, and common sense, and the general public, are all considering the importance of better building and better building material.

IT DOES NOT PAY TO USE BAD BUILDING MATERIALS.

Let us take the single item of brick, as a criterion; and see how much is saved in the first cost, by using inferior, cheap brick. If a building takes, say 200,000 brick of first quality, we will say \$1,800 for the brick; now if we take 100,000 second and third quality of brick, we save say \$200; this will be 9 per cent. economy. Suppose the building to cost \$4,500, if it were built of the best material, \$500 would be saved in using inferior material, and workmanship accordingly, now where is the good policy or inducement, for using inferior brick? No business man, or sensible investor, would hesitate a moment in deciding in favor of the best material and workmanship. An 8-inch thick wall, well built, of hard, strong brick, is better than a 12-inch wall, built in the ordinary way, of one-half of inferior brick, so that, viewed in any way, the best material and workmanship, is the cheapest and best.

A few salmon may be used in chimneys, and a small proportion of foundations may be built of hard bats, but superstructure walls should be built of hard, strong brick, in the very best manner, in order to pay. This would give a preference for good brickmakers, good bricklayers and good builders and builders.

No ordinary kiln of brick can be well and thoroughly burned and cooled, ready for handling, in less time than twelve days—six for burning and six for *annealing* and cooling.

THE WORLD'S FAIR.

Committee on International Exhibit of Clayworking Machinery in 1893, at Columbian Exposition:

CHAIRMAN:		
B. W. BLAIR,	- - -	Cincinnati, Ohio.
SECRETARY:		
C. W. RAYMOND,	- - -	Dayton, Ohio.
ALBERT GLEASON,	- - -	Washington, D. C.
THAD. S. SMITH,	- - -	St. Louis, Mo.
C. D. B. HOWELL,	- - -	Chicago, Ill.

TIME FOR ACTION.

Editor Clay-Worker:

We have noted, with some interest, the discussion carried on by Messrs. McCain, Purington and Cunningham, et. al., relative to manufacturers of machinery being members of the National Brick Manufacturers' Association. We are decidedly in favor of the machinery and kiln men forming part of our annual conventions, as we consider our annual meetings would be tame affairs without their presence, and we all receive many valuable suggestions from them. Each annual convention has become a great school where we learn much that is beneficial to us in our calling; each machine man and each kiln man is there to explain the various devices, and we take their statements and weigh them in our mind, select the machine or kiln which is best adapted to our purpose. Further than all that, the men above alluded to are jolly good fellows, and good speakers, and the social pleasure of meeting them, and hearing them, compensates one for the journey to the Convention. Neither do we consider it would be fair for members to condemn

or praise any machine in open convention. If the machine is condemned, it might be through spite, or pique, or ignorance of operator in working, or inadaptability of clay, and this would be unfair and work a hardship to the manufacturer, and subject him to loss. If the machine was praised, it would look too much like a free advertisement and puffing of some one's goods.

What we started out to write about was the International Exhibition of Clayworking Machinery, Kilns and appurtenances and products of clay at the Columbian Exposition, to be held in Chicago in 1893. As chairman of that Committee, we realize there is a

great deal of work to be done if the exhibit is to be one to redound to the credit of our Association, the mechanic arts and our nation, for where are the people more interested than in anything which pertains to their homes—and the clayworkers' product enters so largely into the structure and decoration of homes. Our idea is, that the exhibit should clearly demonstrate the operations of brick making from earliest times and primitive methods to the present high state of perfection in manufacturing by steam with all its labor saving methods and large output and the ornamental character of the work. Let us also show



W. R. CUNNINGHAM, SEC'Y AND SUPT. OF THE WALLACE MFG. CO., FRANKFORT, IND.

the wet clay method, the wire cut and semi-dry method and the dry press method and their products. Then let there be a department for the display of the wares, terra cotta, enameled brick, obsidian brick, Roman brick, etc., etc., and tile and pottery and all the kindred arts. We are sure there will be no department of this great exhibition that will display a finer line of wares, or excite more interest than ours, and to have such a display, all must take an interest in the matter. We wish the CLAY-WORKER and other journals would have a department allotted to this work, where we could hear suggestions and communications from members of the

craft in reference to the display. Let the machinery men notify the committee, if they intend to make a display, and how much space they will need, so the committee can form some idea of how much space to apply for from the Exposition managers. At our Annual Convention meeting in Chicago in 1893, there will be probably gathered there the greatest number of clayworkers ever brought together, or that ever will be hereafter, and it will be a fine time and place for the machinery men, and kiln men, to display their goods and mechanical genius, with benefit to themselves. There has not been a display made for

a number of years and this should be a fine one. So advise the committee early of your intentions; you will have a whole year, or over, to get ready, but the committee should hear responses from the manufacturers as soon as possible in order to know what space they will need in the exhibition. An early meeting of committee will soon be held to map out the work to be done and arrange the programme. Some preliminary work has been arranged. The various members of the committee whose names will be found at the head of this article, are all live men, thoroughly enlisted in the cause, and aware of the magnitude of the work to be done, and wish the support of every member of our National Association and solicit their advice. We trust we have not wearied your readers with this long communication but deemed it important to lay before our craft our intentions in this matter. We are one of those who believe "enthusiasm is the genius of sincerity and truth accom-

plishes no victories without it," and so do we enter upon this task, believing the mechanic arts have long slept and been slow in asserting their rights but with the march of intelligence have now awakened to a sense of their importance, and none more so than BRICK MANUFACTURING, and let us demonstrate it practically at Chicago in 1893.

B. W. BLAIR, Chairman.
Cincinnati, O., Aug. 1, 1891.

There are three essentials to modern business success: character, intelligence and advertising. Success may come with one of these essentials missing, but it cannot be permanently assured without the three.—*Ex.*

CORRESPONDENCE.

THESE COLUMNS ARE OPEN TO ALL. THE FULL NAME AND ADDRESS IS REQUIRED BUT WILL NOT BE PUBLISHED EXCEPT WHEN PERMISSION IS GIVEN BY CORRESPONDENT. THOSE DESIRING TO COMMUNICATE PRIVATELY WITH ANY CORRESPONDENT WHOSE FULL NAME IS NOT GIVEN CAN DO SO BY ADDRESSING LETTERS CARE OF CLAY-WORKER.

The National Convention and Machinery Exhibits.

Editor Clay-Worker:

We have read the articles written by Mr. McCain and Mr. Purington, in relation to the exhibit of Clay Working Machinery in connection with the annual convention of the N. B. M. A., we hardly see how such exhibits are practicable under the present plan of the Association of holding its meetings in different cities each year. It would be hardly possible to find ready for use suitable buildings equipped with steam power in which to make such exhibits, and if the machinery manufacturers had to provide new quarters each year the expense would be out of all proportion to any possible benefit that would accrue to them. When Convention meetings were held in cities that had regular exhibition buildings, and at the time other exhibitions were in progress, we think clay machinery manufacturers might make exhibits that would be mutually profitable. We think, however, that it always pays any brick manufacturer when contemplating the purchase of a machine to visit a number of different yards in different sections of the country, where he can see several of any of the machines he has under consideration, and where, by talking with the men who have used those machines, not for a few days, but for months and perhaps years, gather the points of relative advantage, the expense of repairs, the number of bricks made per man employed, the interruptions occasioned through breakdowns, and all of the hundred and one considerations that determine the relative values of different machines. If the brickmaker is also a skilled mechanical engineer he might gather an intimation of these possibilities through examining machines in exhibitions, but the majority of brickmakers will only become acquainted with all these facts through the experience of brickmakers who are operating the machines in practical everyday use.

The troubles that Mr. McCain has experienced, and which, to use his expression, have put him "in the soup," would not have been avoided through any exhibits of machines and dryers, unless such exhibit had been made with Mr.

McCain's clay and in his particular city. Both his clay and the fact that he is making brick at an altitude of about five thousand feet are factors in his troubles. He might have tried the same clay in the same machine and in the same dryer on the Atlantic coast and had no trouble.

We do not think that machine and kiln men should be placed in the same category. We think that the machine men have been particularly careful not to occupy the time of the Convention with their particular interests. Any effort to exclude the machine men from membership in the Association could only be partially effective, because many of the machine men are also brick manufacturers and such as are not now would, if necessary, obtain such interests in brickyards as would entitle them to membership.

J. H. CHAMBERS,

Gen'l Mgr. Chambers Bros. Co.
Philadelphia, Pa.

Another Way to Start a Balky Kiln.

Editor Clay-Worker:

In the July '91, No. I notice communication from Thos. Moulding entitled, "How to Start a Balky Kiln." If you will excuse my presumption I will give another way to start and make a balky kiln go ahead. It frequently occurs with brick burners in the South, where we have to use pine wood almost entirely, that our kilns get clogged with soot before we get them hot enough to keep themselves clear, and it is very disagreeable and dirty to be on top of a steaming kiln digging down to the hot bricks, and building up chimney, and bursting gas-pipes and powder bottles to create draft, besides the process is slow and sometimes attended with considerable danger.

Often my kilns get a cold spot in them from accumulation of soot, which is likely to occur in any kiln that is not very evenly set; the fire that almost invariably follows the open places in the kiln. When I find I have a cold spot, or an overcharge of wood, and the kiln commences to choke and spurt fire out of the doors, or don't work free, I use an army musket on her; I put in a heavy charge of powder, and ram it well, insert it in the mouth of the arches about one foot, hold it in a horizontal position, and fire. The effect is instantaneous; the kiln will go to drawing at once, and the operation can be repeated any time it is necessary to do so on short notice. It is necessary to have one of the arches

closed by setting the kiln doors tight up, or the kiln would not receive the benefit of the discharge of powder into it. After the fire has generally made its appearance on top of the kiln, and the cold spot still remains, I charge up the arch under the cold spot full of wood, discharge the musket into it, and seal both ends of the arches up until the fire makes its appearance at the top.

Cold spots in a kiln are hard to manage and the fire will run around them if an open place is near for it to escape, and I often use pulverized clay from the clay-pit on top of the kiln, to equalize the draft, when I have an open spot or unequal draft from kiln not being set regular.

R. A. DRAWDY.

Gaseous Fuel.

Editor Clay-Worker:

I must confess that I am somewhat disappointed with the treatment my letter in your June issue receives at the hands of S. P. Crafts. First he raises a quibble about the quantity and cost of fuel, next, he cannot comprehend my statement about *unconsumed* gases cooling the bricks in a kiln, nor can he understand such gases passing through a white hot kiln without being burnt; then he says he has "waded" carefully through my Convention paper four or five times, and this, it appears, forcibly reminds him of the "North Country Skipper and the Cabin Boy."

From this little episode I can only infer that I am likened to the "Skipper," that I am befogged and do not know what I am talking about. A little rough on me, I must acknowledge, but I have many a time before met rough men with good and smooth natures, and am therefore inclined to credit Capt. Crafts with no intentions of being ungentlemanly. I have once before cautioned him about being so liberal with his candor.

Next he confesses his general ignorance—I am with him in that confession—but with all his fussing and reading during his life, he never came across anything like my statement, of gas escaping from a white hot kiln having a cooling effect. Then he draws on his mother-wit for the frigidness of the statement. Then we have his experiment for ascertaining whether he was wasting any amount of gas; and the result was, that no waste of gas showed up, and it didn't cool the kiln off, on the contrary the kiln got hotter until the whole was at an almost white heat, during all this time no flame of any kind made its ap-

pearance at the top of the gas collecting pyramid.

Now, Mr. Crafts, experiments similar to the one above show conclusively that with all your reading you have neglected a very important branch of natural philosophy, and one so indispensable to a fuel experimentalist, viz., the theory of combustion, and for this self same reason you cannot grasp the idea of unconsumed gases cooling a kiln in passing up through it instead of heating as you would expect.

With your native shrewdness and good common sense, did it ever occur to you, that in collecting the unconsumed gases escaping on the top of your kiln, that you collected the *consumed* gases as well? and are you not aware, also, that carbonic and steam—the products of combustion—would vitiate and render incombustible any gas that might go up through the kiln unburnt? I can scarcely allow myself to think that a practical man of your ability and discernment would allow the fact to escape his notice, that when the pyramid was put on the top of the kiln, the 9 ft. square that it covered, was practically robbed of its draft and the up current of the escaping gases deflected to the outer edge of the pyramid, so that the gases inside this gas collector was at no time any evidence at all of what was coming up through the kiln at that time.

With all due deference to your views on the subject, I think this was an "unprofitable" and a very misleading experiment; fairly and honestly made and reported, I have not the slightest doubt.

From evidence contained in your two letters I have assumed that up to date, you have completely ignored the chemical theory of combustion and as those *cooling off* gases appear such a preposterous barrier to you, I will endeavor to remove it by a train of reasoning that you will have no difficulty in following up and will show you not only that it is so, but that it cannot be otherwise.

We will go to your brickyard and we find your brick burner just luting up a kiln that he has finished burning. I ask, "Why do you plaster up so carefully every crevice?" You reply, "To keep out the air." "Why, what harm would the air do?" "It would spoil the bricks by cooling them off too quickly." But yesterday you were admitting a strong current of air to raise the heat on that kiln and now you are shutting every particle out to prevent cooling. Will the air do both? "Oh, yes, it will raise the heat if there is plenty of fuel, but it will cool it very quickly when there is insufficient or no fuel." What is the effect if you overcrowd your furnace with fuel and shut off the air supply? "If such a course were persisted in, you would soon cool down the kiln by deadening the fire."

Capt. Craft is quite familiar with all this and has not failed to observe that excess of air or fuel, or a lack of either, produces similar effects on the kiln, viz., a cooling off. An excess of air either

robs the furnace of its heat or ascends the kiln, robbing the bricks of their heat as it goes up among them. An excess of fuel and lack of air will produce an excess of gas which cannot ignite for want of air, therefore cannot give out its heat, and is, before ignited, at a much lower temperature than the kiln; this gas then in rising through the bricks actually robs them of a portion of their heat and finally escapes at the top unconsumed; in fact, wasted. *Combustible gases give out no heat until they are ignited, and they cannot be ignited, without a supply of air or oxygen. The highest known temperature fails to ignite this fuel in the absence of oxygen, it can only heat it.*

I think now, it must be evident to the Captain, that air only cools his kiln when it passes up through the bricks *unconsumed*. And now, what is air? Practically, it is a mixture of two *gases*; one of them quite as indispensable as the fuel itself, in the production of heat, but quite incapable of producing heat of itself, and the same may be said of the fuel—that it cannot of itself produce heat. If the Captain will add coals to a fire, and, by some means shut off the air supply entirely, he will as effectually put out that fire as by adding water. Unburnt fuel then, not only gives out no heat, but robs the fire of the heat it contained, and in the same way *unburnt gases* passing through a kiln, rob the bricks of the heat they have already acquired from *burnt gases*. I wish to call the Captain's attention to the difference in the effects produced by burnt and unburnt fuel; I wish him also to discern between *heating* and *burning*,—they are not synonymous terms. If he supposes—as a great many practical men do—that heat alone is necessary to burn up fuel, etc., he—like them—is very much mistaken, for a piece of coke, charcoal, or anthracite coal may be kept at steel melting heat for any length of time, without materially changing its structure and composition, if it is kept free from contact with oxygen.

I think if the Captain will *ponder* over what I endeavor to tell him—not take a superficial glance at it—it may lead him to think somewhat differently about what is going on in his kiln when he is *burning*, as it is termed.

And now let me try to dispose of the 30 or 40 per cent. saving in fuel question.

So far, in my letters to Capt. Crafts, I have only dealt with the saving in the *cost* of fuel. I did so because, as I have told him before, his style of kiln is not adapted to regenerative purposes, therefore not suitable for effecting the saving in the *quantity* of fuel stated.

However, even in his style of kiln, the *quantity* of fuel may be lessened considerably, by securing a more perfect combustion of the fuel than it is possible to effect on an ordinary grate furnace. This, with the advantage of using slack coal—which the Captain could not do on his grate—will effect the saving in *cost* to the extent of 30 or 40 per cent., as stated, and in many cases, much more,

but with regenerative appliances, as well, 75 per cent. of *cost* of fuel is easily within reach in a great number of yards.

The fuel *bill*, not the *weight* or *quantity*, is what concerns most brickmakers, and I feel quite assured this would be the only consideration that would have any weight with the Captain.

In a former letter, the Captain, in alluding to the perfection of his furnace, tells me he can easily bear his hand on the top of the furnace. To this, I have only to say: It proves that the Captain has prevented loss by *radiation* to a great extent, in his furnace, but this is no check to the losses of heat by too much air, too little air, and the losses incidental to ordinary grates in general. Admitting, then, that he has a *non-radiating furnace*, what can he say about the thin walls of his kiln, do they not radiate a considerable portion of heat?

The last paragraph of the Captain's letter contains his desire not to be considered officious. I clear him of this, so far as I am personally concerned; I really have not seen any signs of it yet, and I admire the motive that would prevent either young or old men from experimenting in the same uncertain path as the Captain did in the experiment he has described. Nevertheless, the Captain appears to be perfectly satisfied with this same experiment, and considers it a complete refutation of my statement concerning unconsumed gases cooling off a kiln, etc.

Now, Captain, one thing appears pretty certain, that one of us is most certainly far worse befogged than your "North Country Skipper." I very naturally think it is you, and it is your privilege to think the same of me, and, I have no doubt, if it came to a vote, you would obtain three to my one, which would be a very easy way of disposing of scientific arguments, if it were reliable, but, unfortunately, science is pretty well mixed up with anomalies, and we are led to exclaim with Little Buttercup, in H. M. S. Pinafore:—

"Things are seldom what they seem,
Skimmed milk masquerades as cream," etc.

Apologizing to you and your readers for the length of this letter,

WM. WAPLINGTON.

A Chance for an Investment.

Editor *Clay-Worker*:

Here is something worth investigation by "our capitalists." I chanced on a brickyard in Pennsylvania, which by developing, can be made into a really fine and lucrative concern. The plant is located right on the C. R. R. of N. J., there being a siding right into yard, and adjoins on the other side the Lehigh Coal and Navigation Co's Canal. It is also close proximity to the Lehigh Valley R. R. The plant proper comprises 14 acres of very fine red and white clays, engine and boiler, one I. X. L. Brick Machine, two kilns, and dry sheds, racks, and pallets. The water supply is abundant and the coal good and of fair price. The clay makes fine, either red or white bricks,

and, combined, makes a very superior "granite" brick, such as are in big demand by the New York market. This class of brick is being shipped a distance of 600 miles into New York City, (this plant is only 100 miles distant.) The owner has had his clay tested by the dry press process and proven its adaptability. A finer building brick is in demand in that section, and the owner (who is a thorough, practical brickmaker, of large experience,) is desirous of increasing his facilities to meet the demand. For party desiring good investment for capital, I am confident—if investigated—the above will present the opportunity. Mr. A. M. Kay, Walnutport, Pa., will supply further information.

J.

The Brick of the Future.

Editor Clay-Worker:

Your esteemed favor of the 8th inst. is to hand. Sorry to have missed my December and January CLAY-WORKERS. Hope you may be able to find a copy of each for me as I would like to read the Convention reports.

I don't know of anything of interest in reference to the manufacture of paving bricks beyond being glad that the terms "fire brick" and "fire clay" in connection with paving brick is fast disappearing, and also that progressive brick manufacturers are at last beginning to see that it requires a gritless clay to make a properly vitrified brick.

The less grit a clay contains, with a reasonable amount of silica, the better it vitrifies and the stronger brick it makes. With this theory I commenced experiments twelve years ago. This is also the clay for "dry process" brick—the future method of the manufacture of paving brick, just as it is the already practically demonstrated method of making vitrified front brick. A clay that is not "strong" enough to stand the dry process to make a vitrified brick will be condemned in the future for a paver. The coming building brick will also be a vitrified brick. Sanitation alone, above everything else, if nothing else, will demand this, and the sooner brick-makers will aim towards this point the better it will be for their industry. In fact a large part of the public health is in the hands of the brickmakers. It is they who can benefit the health of the people more than any other producer of building material. Good-bye to stone for residence purposes where non-porous brick are used and where the people become educated to the business damp houses bring to the doctors and undertakers. The manufacture of vitrified brick also settles the question of "whitewashing" and that of fire.

What is now called a clay bank will be called a mud bank, and certain deposits of soft rock, uniform deposits of disintegrated shales and shales, will be recognized as the "clay banks."

It is, however, a pitiful condition of

the trade, say nothing of the "innocuous desuetude" of many architects, that the vitrified brick at this enlightened age has to meet the prices of porous mud brick that float by the high sounding names of pressed, front and face brick.

THE PROFESSOR.

Paving Brick Clays.

Editor Clay-Worker:

As many are seeking information in regard to material suitable for making paving brick, and where it may be obtained, the following extract from a letter written in response to an inquiry from J. H. Price, Chairman of National Board of Trade, Scranton, Pa., may be of interest to the readers of the CLAY-WORKER, especially those who are thinking of engaging in the manufacture of paving brick.

"Large quantities of paving brick are made from the fire clays of West Virginia and Eastern Ohio. The shales overlying the coal and especially those which have a large proportion of iron are considered excellent for the purpose. The word shale is hardly a proper one to define these aluminous rocks, for they do not have a slaty appearance as the name implies. When slacked by exposure to air and when mined they break into very irregular pieces, especially those that have a large proportion of alumina and when crushed and tempered make the more plastic clays. The more silicious the more liable it is to slacken by atmospheric influences, and the more difficult it would be to make into brick, but would be less liable to crack in the drying process and in burning and cooling. These aluminous rocks are very abundant and may be found, I believe, wherever coal is found. Whenever the outcropping slackens into pieces oval or diamond shaped in their cross sections, and having a considerable quantity of iron, the material has the indications that it will make a good paving brick; but before money is spent for machinery or construction of works, it should be tested. The forms into which these shales slacken on exposure to atmospheric influences reveal their aluminous nature. This is also true of fire clays. An aluminous earth or rock slackens into irregular cubes. When the silicious element is in larger proportions there are slaty pieces, with fewer vertical fractures. By grinding them in a mortar or pounding them with a hammer and mixing with water the degree of their plasticity will be developed. There is no doubt that there are plastic clays formed from the decomposition of these rocks that will make good paving brick, but they are more liable to have impurities that will prevent their forming a vitrified body or make them unable to support their weight when subjected to a heat necessary to make such a body. It matters but little what the color may be—white, like stone china, brown, like sewer pipe or blue, like stone ware—so long as it has a vitrified body and a clear metallic ring."

GEO. S. TIFFANY.

Some Interesting Correspondence.

Editor Clay-Worker:

I have been reading carefully the series of papers you are publishing under the title of the "Fuel question." It is a very important subject and as very many of the readers of the CLAY-WORKER are no doubt equally interested, I enclose some letters bearing on the question; which you are at liberty to use if you see fit.

T. S. S.

SOME QUESTIONS ABOUT GAS PRODUCERS.

T. H. Brooks & Co.,

Cleveland, Ohio.

GENTLEMEN:—Seeing your advertisement and the claim made that your "Fuel Gas Producer" could be applied to burning bricks with gas, I wish to ask a few questions which properly answered may throw some light on that important question.

I presume that your process is identical with that of the "Siemen's Gas Producer," so much used in the reduction of iron ore and in the making of iron, and having in that connection imbibed the idea that such gas could only be used in very large pipes and in combination with a regenerator, I wish to ask first, whether the gas from your producer can be inflamed without the use of a regenerator? Because in the first stage of burning a kiln of brick the bricks are cold and charged with a great deal of water, and a regenerative apparatus would complicate the application to brick burning very much.

Secondly, can you produce gas to be led through pipes that are again subdivided so as to conduct the gas to each arch in the kiln separately? I ask this question because I have always understood that this gas bears a great deal of tar, which is readily precipitated and tends to clog up any but large pipes. Thirdly, how much coal does your producer consume daily? I now use daily when burning brick about 20 tons of bituminous coal.

Lastly, what is the cost of your producer? Very respectfully,

St. Louis, Mo.

THAD. S. SMITH.

REPLY TO MR. SMITH.

DEAR MR. SMITH:

T. H. Brooks & Co., of Cleveland, Ohio, have sent your inquiry to me to answer.

As you say, Siemen's gas is best used in regenerative furnaces, but it can be used directly through with far less economy.

For fire brick a suitable degree of heat cannot be reached without hot air to burn the gas. For red brick it can. You do not say what your product is.

As to fuel gas, carbonic oxide is the ideal ingredient. It will give a temperature above the dissociation point of water, and bulk for bulk has higher calorific power than hydrogen. The latter's high calorific power per unit of weight is offset by its extreme lightness. The low inflammability of producer gas is caused by the high per cent. of nitrogen it contains. Fifty per cent. saving in fuel by the use of producer gas cannot be reached in brick burning without

regenerative kilns, such as Dunnachie or Mendheim. Some saving may be effected by the use of producer gas, and further advantage are gained by the steady, easily controlled heat, by turning the gas from one kiln to the next without drawing fires; but the better quality of the product the less wear on the kilns, and by handling all the coal and ashes each at one point for the whole plant.

Our producers will each gasify four or five tons of coal per 24 hours, so you would need four for your work. Water gas would be too expensive for use in brick burning. Good producer gas, such as made in Weilman producers, properly run will burn all right in a cold kiln. Producer gas can be subdivided considerably, but not as much as water gas or common illuminating gas. This is because the gas carries with it more or less tar and soot, depending largely on the quality of coal as to the amount, which is deposited along the passages. These passages are, therefore, made excessively large, so that they will be ample in size, say at the end of a weeks run. Small pipes are soon clogged.

The price of iron in each producer includes shell, downtake, and all castings fitted ready for erection. Foundation cost would depend on the ground. Erecting, lining and flues to conduct the gas to the points of consumption would be extra.

In the figure, the lining of the passages and the 9-inch lining of the shell are second quality fire brick. The backings are of red brick. The flue shown is ample for four or five producers.

Very respectfully,

H. B. HUBBARD,
Metallurgical Engineer.

Pittsburgh, Pa.

Machinery Exhibits; Open Criticism,
Etc., Etc.

Editor Clay-Worker:

I have read brother McCain in the May CLAY-WORKER and then Bro. D. V. Purington in the June and W. R. Cunningham in the July number, touching on the question of exhibiting machinery at the meetings of the N. B. M. A. Bro. McCain is very much in favor of the exhibit while Bro. Cunningham takes the opposite view and Bro. Purington is one way or the other, which ever suits the Convention.

There are, I think, several questions that it is well to consider in this connection. The first is the probable character of the exhibit. Suppose that all the machine manufacturers should exhibit a full line of machinery in operation, is it not to be presumed that the machinery will be handled by experts, with the best selection of clay—worked over and over again? Everything working to perfection because the conditions are favorable. In a word, it is clayworking machinery in Sunday clothes. Those who have had experience in operating clayworking machinery would be asking themselves: "But how would this machine work in my clay? To those

inexperienced the exhibit would be a taking success, except there would be a confusion of tongues in making a choice. At fairs and expositions such exhibits have been made, but there is such a sameness in the character of the work done, that, upon the whole, the exhibits, to practical men, have been unsatisfactory.

Then there are shrewd schemes devised to make an impression. Machines are carded in large letters as sold to go to —, or the party purchasing is named, and he is very likely to be, if he is influential—all of which is intended to "take the lead." We presume that the manufacturers of clayworking machinery are as honest as any class of business men, but shrewd business men, wide awake to their interests, are very likely to look after the making of favorable impressions, so far as they can.

Another matter in this connection to be considered, is: Will not such an exhibit detract from the interest in the sessions of the Convention? "Oh, no," says some one, "the machinery can be stopped and the doors to the exhibit closed during the hours the Association may be in session." Yes, may be so. But stop and think a moment. Such an exhibit would be necessarily scattered, let the Association meet where it may. And how convenient it would be to have a half dozen or more go quietly with an expert friend, and, under lock and key, examine the machinery during the sessions. The parties exhibiting have rented the room and power—it is their own for the time, and it is to their interest to make the best of their investment.

When the hour to begin the sessions of the Association arrives, half of the membership would be at the machinery exhibits or on the way to and from, or we miss our guess.

But an exhibit that will be satisfactory—fair alike to all the exhibitors, is simply out of the question. The room and the power to accommodate all alike, cannot be had in any city in the United States. Such an exhibit, to do justice to all, would have to be provided for in the erection of suitable buildings, with power, which is out of the question, so far as the Association or the manufacturers of machinery are concerned.

But it may be said: "Let those who can, get room and power to exhibit—'first come, first served.'" But such an exhibit would fall far short of what is contemplated by Bro. McCain. It would be unsatisfactory because of the limitations. Two or three, by chance, might secure the room and power, and others would be unable to do so. The latter, in some way, would have to counteract the advantage thus gained, so there would be friction.

After all, is it not better to leave off the exhibit, since it will not be possible to secure room and power to accommodate all in making a like fair exhibit of their machinery? Think of the space that Bro. Endaly would require for one of his mammoth kilns, or Bro. Sharer for one of his dryers, and then to think

our Chicago friends or the other fellows would go them one better—what a demand for room there would be.

"Are they not all broad gaged?"

Bro. McCain seems to think that it would be the easiest thing for those present to tell what kind of clay they are working, and how their machine works such clay, so that all might go home from the Convention fully satisfied that they have learned more in regard to the success of their business, etc.

Is it not true that you may handle clay, and have its workings described to you, and then afterwards find out, by practical experience, that the first conclusions were mistaken theories?

There is, to us, a great deal of Greek in some men's description of their clays.

We imagine that men go home from every Convention fully satisfied that they have the key to success, to find out afterwards that there is much to be learned, in the line of clayworking. Besides, think of it, how easy it is for manufacturers of machinery to have two, three, or a half dozen men, from different sections of the country attend, having their expenses paid, to stand round to aid in making good impressions. If B has a yellow, tough, stony clay, and wants to know how it would work on a — machine, he is referred to K, who has just such clay. B thinks he has gained valuable information, but, after all, he may have been misled.

We cannot forbear saying a word about allowing open criticism of machinery in the Convention. It looks well to do this as a matter of information to the craft, but will it not open the door to very great injustice? For example: A is an impracticable, wordy fellow, with plenty of money to start with. He goes into the brickmaking business, buys a good brick machine, but does not know how to use it, and never learns. He splurges away until he almost bankrupts himself, and then concludes to attend the annual meeting of the N. B. M. A., where he is ready to enter the field of criticism against the machine he has failed to operate. The fault was his own, but, no matter, he goes for the machine; he talks glibly and makes the impression intended. Open criticism in the Convention would but open the way for impracticable vindictive men to do incalculable injury to the reputation of the best machinery in the land. Discreet men hold their tongues, except in confidence aside to some member of the craft, when applied to for information. And right here is one of the most important benefits to be had from attending the conventions. A, B or C, manly fellows, are called upon to give their experience—they do so with reserve. You can mark them, and go to them in private and get the desired information in confidence. This feature alone, of the Convention work, is, in our opinion, worth more than the cost and time required to attend; that is, if you are in need of any information, and if you think you know it all, attend anyhow, and exhibit your-

self as a curiosity to the clayworking craft.

A WORD FOR MACHINE MEN.

Say what you will, they have done well for the conventions. They are liberal, sociable, and ready to impart information, and as reserved in the expressions of good opinions relating to their own interests as could be expected. They are men of large observation, and many of them are men of experience in clayworking, and quite ready to impart information of value to the craft.

Bro. McCain expresses the wish that the next meeting of the N. B. M. A. be held at Washington, D. C., which would be Bro. McCain's opportunity to visit that city. "It is well." "So be it."

But I suggest that it might be well to hold an annual meeting at the World's Fair, that is, let the Fair take the place of a machinery exhibit. It is only a suggestion.

PETER SIMPLE.

Enameling Brick.

Editor Clay-Worker:

The next operation in enamel brick-making is to put on the enamel. Many methods have been adopted but we need not notice them here. Dipping is, by universal consent, the only method that will bring the best and safest results. There is three distinct ways of doing this, and each of these ways are fraught with its separate and distinct difficulties. All these methods are in operation in this country in various places.

The first method was to dip the bricks into the enamel and to slide them onto the racks, and when the enamel was set to take them off and set them on the floor to dry. But it was often the case, that when they were picked up again the enamel would drop off onto the floor, owing to the fact that the brick had shrunk more over drying than the enamel. This was not the case in every place, but this only went to show that this method was precarious and uncertain. Now to prevent this, many things have been tried, but I will not enlarge on them here, but will give my own remedy, and this can be relied upon with the fullest confidence.

Take blue ball clay, dry it well, and then pound it small and put it into a vessel and pour clean water onto it, and let it stand a few hours to soak. When it is sufficiently softened, stir it up well and sieve it into another vessel. Let this slip weigh 28 ounces to the pint. Then take clay that the bricks are made from and put it through the same process, and let the slip from this weigh the same, that is, 28 ounces, to the pint. Now have another vessel, and take any measure you like, and put one of ball clay slip to two of brick clay slip, to any extent you may require. Then stir this up well and sieve it all into another vessel. By this means it will be well mixed and ready for use.

Take this and dip the bricks into it (that is, the face to be enameled,) and let them stand on the boards for ten or

twelve hours to give time for this to set to the bricks, and then dip them again into the enamel.

You will perceive, I have no doubt, the utility of this first dip. It is a sort of reconciling medium betwixt the brick and the enamel, taking a firm grip of the brick on the one side and the enamel on the other, and if this process is carried out properly, it will prove successful and satisfactory.

Now the other two processes arise out of a question like this: What is best to be done with the bricks now? Should the bricks now be dipped in the glaze and set in the kiln and burnt once, or should they be put in the kiln and burnt biscuit, and then dipped into the glaze and burnt a second time? This can only be determined by the nature of the clay. All clays contain gases that are obnoxious and detrimental to all glazes, and by burning biscuit these gasses are eliminated and the goods are a better color. But the first operation that takes place after the bricks are placed in the kiln is expansion, up to a certain point of the firing, and this means that in a second burning there will be a second expansion, and this is just what takes place. Now some clays will crack and burst in the second firing, for the simple reason that they will not stand a second expansion, therefore you will see the impossibility of making enameled bricks by the double firing process out of such clay. The other process is to burn the bricks without the enamel, then to dip them into the enamel, and then to dip them into the glaze almost immediately after, and burn them the second time. This is called the new dip. It has this advantage: All bricks that may be in any way damaged can be rejected for enameled and sold at a fair price for building purposes, as they are worth more without the enamel than they are with it on. But this method should be adopted with caution. Many here have been grievously disappointed with it. In some cases it has come from the kiln all right, but when it has come to be exposed to the atmosphere the enamel has fallen off, for the simple reason that it has not formed a complete junction with the burnt brick.

One of the first two processes, I should advise, because they are safer if they are dipped in the glaze in the clay state. They must be perfectly dry, and before being dipped in the glaze must be dipped in clean, cold water for a moment, and when the water is absorbed into the brick it must be immediately dipped into the glaze. When the glaze is dry the surplus glaze and enamel that sticks round the edges must be brushed off with a wire carding brush quite square and even, and the bricks will be ready for the kiln.

MANAGER.

A Good Prospect.

Editor Clay-Worker:

Enclosed please find check for CLAY-WORKER to Jan. 1st, 1892. The demand for brick this season is good—better, if

anything, than last year. Binghamton has grown so rapidly for the past few years that it has given the yards here business to their full capacity.

W. P. Pratt.

Binghamton, N. Y.

An O'er True Tale of How a Tile Mfr Tried to Dry Tile By Exhaust Steam.

Editor Clay-Worker:

'Tis said that truth is stranger than fiction and I am very much inclined to believe it since hearing the story of how an Iowa tilemaker tried to dry his tile with exhaust steam. The occurrence is said to have happened in this immediate vicinity and is told about as follows:

A gentleman in the tile business who had some difficulty in drying his ware successfully, heard, that at some factories they were using exhaust steam for drying, so he concluded to try it. He let all of the exhaust steam directly on the ware in the sheds, closed the ventilators and doors, and let the stuff sweat. Such a fog as was in that shed! The darkest London fog wasn't a comparison, but the ware did not dry so fast that it cracked; Oh, no! It dried slow enough, but the tile had a tired appearance—sort of a let-me-lay-down-and-rest look, and a great many were so weary that they did rest.

A gentleman who was visiting the factory was shown the new improvement, and, not understanding it, remarked that there seemed to be a sort of a goneness in some of the pipes, they were leaking badly. "Oh, no," said the owner, "we are drying with exhaust steam, but they do not dry as well as I would like to have them." Then the visitor told the owner that he had heard of people using exhaust steam, by conducting it in pipes under the floor, and letting the heat from the steam do the work. Owner believed he would try that.

Of course, boughten experience is good and lasting, but why not take the CLAY-WORKER, or attend the brick and tile conventions, thus getting the experience the other fellow has bought, at excursion rates.

W. H. Y.

Davenport, Iowa.

Kaolin in Florida.

Editor Clay-Worker:

Copy CLAY-WORKER received, for which accept my thanks.

The recent discoveries of large deposits of a very fine grade of kaolin in the Palatka Valley, near here, has opened up a new industry for this section, which promises great results. The present obstacle seems to be the lack of a suitable fuel, wood being plenty; it has been the only fuel used, and, although near the coal mines of Alabama, that product of Mother Earth is a luxury, on account of the excessive transportation charges; this, however, may be overcome by water transportation. The beds are situated

on the Palatamaha River, a tributary to Lake Harris, and in direct water communication with the Atlantic, and reaching into the dim future, on the natural course of the proposed Florida ship canal. The Bloomfield Kaolin and Phosphate Mining Company is the only one incorporated as yet, but others are soon to follow. Such men as Rev. J. F. Richmond, author "Our American Italy," "Diamonds, Polished and Unpolished," etc., etc.; Col. G. C. Stevens, the Phosphatic King, of Ocala; Gen'l. B. F. Adams, the enterprising Real Estate man of Eustis, and Col. G. T. King, one of Lake County's foremost horticulturalists, are largely interested, and the new discovery will not lack for entergetic backing.

Samples of ware manufactured from these deposits were on exhibition at the Semi and Sub-Tropical Expositions at Ocala, and Jacksonville, last winter, and drew forth much favorable comment from the press and the people at large. The clay has been thoroughly tested and has not been found wanting. Good judges assert that it is far superior to the best imported article, it being necessary to mix native clays with the imported to give it the tenacity that this contains in itself. The day seems not far distant when Florida will produce a very considerable proportion of the China ware and other clay products used in the Southern States.

The white kaolin is not our only clay. Florida is abundantly supplied with this product. Brick clay is found near Aster in this county. There are beds near here and others in the counties north of us, which will undoubtedly be developed with the country.

R. W. BENNETT.

Okahumpka, Fla.

Melting Points of Metals.

Editor Clay Worker:

The following extracts from further correspondence of Hydro-Carbons on the subject of "The melting points of metals and alloys, etc." are, I consider, of sufficient interest and value to every one connected with a business in which anything relative to heat is of so much importance, to merit a place in your columns. I am the more convinced of this, as I find the statements regarding the melting points of different proportions of tin and lead, carried out in practical use in the making of solder for canning purposes.

R. M. GREER.

Hydro-Carbon,

Care Clay-Worker.

Please accept my thanks for your explanation of "The melting points of metals and alloys," published in May issue of the CLAY-WORKER. What you say with regard to alloys, makes that part of the subject very clear. I hope, however, you will not consider me very stupid, if I have to go back to "the melting points" before referred to, and ask how it is, that, if "a mixture of 3 of tin and 8 of bismuth melts at 212°, 1 of tin

and 1 bismuth," containing a much larger proportion of the more fusible metal, requires a higher temperature, melting "at about 285°." * * * *

R. M. GREER.

R. M. Greer,

Tuxpam, Mexico.

* * * * *

Well, now to business. I am not prepared to tell you *how*, or *why* it is, that an alloy of 3 of tin, and 8 of bismuth, melts at a lower temperature than equal parts of these metals. It is one of those anomalies we are constantly stumbling over in our enquiries, and is of frequent occurrence in alloys. Take another instance or two—3 of tin and 1 lead 367°—5 of tin and 1 of lead 381°. Again compare equal parts of tin and bismuth, with 2 of tin, and 1 bismuth, 334°. A similar difficulty presents itself in comparing the hardness of alloys, with the metals composing them; for instance, 4 to 5 of tin, and 16 copper, is the *hard* alloy, we call bell metal.

Chemical combination of different elements, affords endless instances of similar anomalies, which are, after all, only apparent, for there is undoubtedly a law, or laws, that would show us the why and wherefore of it all, but as far as I am personally concerned, I am utterly ignorant of such laws, and am obliged to take the facts for granted. * * *

HYDRO CARBON.

Not Re-Assuring.

Editor Clay-Worker:

In one of my communications, I said that August was the month of harvest, and possibly would be for the brick trade. Well, it bids fair at present to be a harvest of disappointed "hopes." I may say that our manufacturers have had nothing to sustain their courage but "hopes" that the next month there would be an improvement in prices. Month after month has come and gone, still low prices rule with no immediate prospect of an advance. Is it any wonder that the manufacturers have a careworn look? Putting stock under sheds with a probability that it may not bring any more than present figures, and certainly there will be no advance, unless there is a very decided and universal movement among the manufacturers for an early stop, and then keep the bricks under the shed until a satisfactory price is obtained. Certainly as long as the purchaser has an overflowing market to pick from, low figures will be the order. My last advice from the brick market reports thirty barges lying at the dock waiting for some one to come along and buy. Think of about eight million brick afloat. No doubt some of your readers will say, "Why do the manufacturers send them in?" Ah, my friends! if you can explain the "why" you are a prophet. I can in some cases explain the "why," as the majority of the Hudson River brickyards are leased and are compelled to make a given quantity of brick or pay for them.

I will cite a case in Haverstraw. There is a yard that has but one hundred

and thirty eight feet front, on it are two machines, pays \$1.25 per M rent and has to make four million brick or pay for them. Every sixteen and a half feet contains four arches, each arch has about forty thousand brick in it, which means that he must ship over sixty arches before he can begin to hold his stock.

There are many in the same boat with him, still there are some that are shipping that could hold but don't. I will not venture to say why they ship. I must say that the brick manufacturers of Hackensack have kept their brick off the market to a great extent. Four of the yards have not shipped any of this seasons work; one sent two barge loads. The outlook here at present is that not many moons hence all the yards will be as silent as a graveyard. On July 3rd, there was one stopped. August 1st, another run their last pits. Only think of it. Between the two there is capacity of production of ten millions; they have only made three. Another yard that has a producing power of sixteen million will not make over seven this season. Prices range about the same. If they should drop any lower our manufacturers would begin to think that the Fates were against them. While the proprietors are feeling this effect of low prices the laborer is seriously effected in his pocket as the yards will not run if it looks like rain. The result is, the men do not make over four or five days per week. The old Saw about misfortunes not coming singly was the case with one of the manufacturers. The engine house on the yard of Mr. Hiram Walsh, was completely destroyed by fire two weeks ago. No insurance.

Micawber was always waiting for something to turn up. His patience was nothing to be compared to the patience of the Hackensack brick manufacturers.

Your Philadelphia scribe says that they have a good Lien Law; so have we, from local trade, which would probably use half a million a year. One yard can turn out thirty million in the same time. How about the balance that has to be shipped to the New York market?

In my next I will give your readers an idea of how much brick is handled in the New York market.

If the Queen City of the west should make a success of the World's Fair, there will not be a brick man from the East that will look at the brick used in the construction, but will associate them with the letter and photos in your last number, where women were prominently set forth as reliable labor. God forbid that such labor should ever be used in this section. If it should be tried I think the manufacturers life would be made miserable. We live in the nineteenth century, but it would seem as if the Chicago manufacturers were not aware of the fact.

A. N. OLDTIMER

Hackensack, N. J.

THE CLAY-WORKER.

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T. A. RANDALL & CO.,

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*INDUSTRY'S MONUMENT.

It was a pretty sentiment that led a brickmaker, who began his career in the early days of one of our western towns, to call the town, that had grown out of its wooden era, and the rows of buildings built of the bricks it was his to make, his monument. There are monuments and monuments, and there is in that sentiment a something really more enduring because so useful than the pretentious monolith that is more often a monument only to the vanity of human nature rather than its better spirit. It was like Cornelia's jewels—her children—whose minds it was hers to create for the regeneration of old Rome, and yet lives in the spirit that surrounds our modern youth, while monumental Rome is either lost or been turned from its purpose and spirit, much as Hadrian's costly mausoleum to his wife Sabina became the gloomy castle of St. Angelo and turned into the torture chambers of mediaeval fanaticism.

This brickmaker's monument was the monument of his honest work—labor performed in behalf of his wife and children, and for his native city. Instilled in every brick, in every city, is this same spirit, and since we heard his honest sentiment and felt his honest pride, we see bricks a little differently. The record of heroism is not all in terra cotta inscriptions, for the plainest brick waxes eloquent when one's brain sets to working on it, chiseling out the fancies

inspired by one man's honest conception of his true monument.

A GOOD RECORD.

In response to a letter of inquiry from a Councilman of a neighboring city, as to the durability of brick pavements, Mr. M. Darrah, Clerk Board of Public Works, Wheeling, W. Va., writes as follows:

"The first brick pavement was laid in this city about ten years ago, and is yet in good condition, and has had little or no repair. The pavement was laid as an experiment, and it has proven successful. This city has laid new brick pavements every season, and we consider it *the only* pavement. We have advertised for 400,000 brick to lay this season.

This pavement costs us from \$1.20 to \$1.40 a square yard; brick, sand, etc., all laid down, the price varying according to amount of excavating to be done. There is no question but that a brick pavement when properly laid on good foundation, is the best and cheapest. At least, we have found it so."

THEY MIGHT TRY OIL.

David Wagstaff has a brickyard near Toronto, Ont., and recently built some kilns within a few feet of the property of Leslie & Son, nurserymen. Recently one of the kilns was fired and Messrs. Leslie & Son brought action against Mr. Wagstaff before a justice and obtained an interim injunction restraining the latter from further proceeding with the burning of the kiln. The ground on which the injunction is granted is that Leslie & Son have on the ground immediately adjoining that of the defendants rare and very valuable trees and shrubs which are kept for the use of the plaintiff's business as samples and as a show ground and that the smoke and noxious vapors and fumes arising from the burning of bricks will destroy them.

EDITORIAL COMMENT.

An Eastern subscriber writes: "We are in need of a thoroughly practical brickmaker to inspect our plant, and one on whose opinions suggested improvements he might think necessary we could firmly rely. He must be ABSOLUTELY COMPETENT to pass judgement on our plant as a lawyer would on points of law, for on his opinion would depend the investment of money in the yard. We use a stiff clay machine and a steam dryer. Our capacity is 30 M per day. We employ about 40 men. We would

be willing to pay a good price to any man competent to make such an inspection, and advise us of proper means to increase the efficiency of our plant."

Our patron is evidently inexperienced and is seeking information in a practical manner as he would in any other line of business or profession. Why should he not obtain reliable expert testimony and council as to the best and most economic methods of brickmaking? Are there no masters of the art in all its details, or must the gentleman seek out some one who by actual experience has worked out his own salvation with similar machinery and appliances, before he can hope for trustworthy advice.

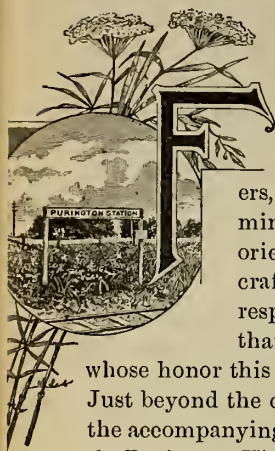
In another column "The Professor" gives his views on vitrified brick in a brief but forcible manner. His position is ultra and he can scarcely hope to live to see the adoption of the reform he advocates. The Professor's views on fire clay pavers are less radical and will doubtless prevail generally ere long. The term fire clay as ordinarily applied to paving brick is a misnomer and should never have been used in that connection. A brick containing an appreciable quantity of true fire clay is, in the nature of things, not suitable for paving purposes.

The employees of A. Dotterer & Bro., of Philadelphia, are out on a strike. They struck for a return to the list of wages paid prior to a reduction, which was made during June. The men claim that Mr. Dotterer promised them a return to the old list, (which was the list agreed upon in the spring,) as soon as business became brisk enough to warrant it. They claim that time has arrived. Mr. Dotterer says it has not and refuses the increase. At the present time it looks like a complete shut down, as Mr. Dotterer refuses most positively to grant the increase asked for.

A New York State subscriber asks: "What PROFITABLE use can be made of brick-bats?" And adds that, "it would seem as though there ought to be some use for them." If some inventive Yankee will invent a use for bats that will bring them into general demand he will be hailed as a benefactor by brick manufacturers generally.

Jno. F. Short, Secretary, City Council of Clearfield, Pa., writes that it has been decided to pave four miles of streets with brick, and he would like to correspond with manufacturers or contractors who are prepared to do the work.

BRICKYARD SKETCHES.

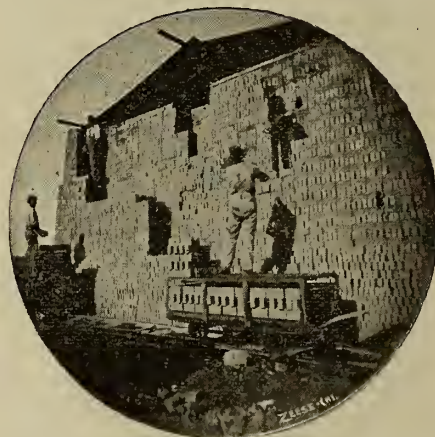


FIFTEEN miles south of Chicago on the great Rock Island Railway is the station Purington, a name familiar to our readers, and one that brings to mind many pleasant memories. No member of the craft is more universally respected and admired than D. V. Purington, in whose honor this little station is named. Just beyond the clump of trees shown in the accompanying sketch is the works of the Purington Kimball Brick Co. There is no inky cloud hovering over this plant—that usual sign of a brickyard, smoke, is conspicuous by its entire absence. Though one or more kilns containing 840,000 brick are on fire continuously almost the year through, there is no smoke to darken the heavens and depreciate adjoining property, for oil is the only fuel used about the works now. Even the boilers are fired with it, and the old time coal heaps and concomitants—smudge and smut, ashes and cinders, are things of the past. The plant, which we recently visited in company with D. V. Purington and H. C. Hayt, presents a different appearance than when we last saw it.

IN THE CLAY PIT

Or bank, (which is assuming township proportions,) are two Barnhart steam shovels, made by the Marion (Ohio) Steam Shovel Co., digging easily a quantity of clay that, handled in the old fashioned way, would require an army of men. There is something about these ponderous machines that is fascinating to us. We like to watch them as they are set in motion. They seem almost endowed with life: The huge arm reaches down and up and then lifting its iron hand, filling it with clay, taking a portion of each layer or strata from top to bottom of bank, deposits it in the car at its side. It is not only a great labor saving device, but admits of a more perfect admixture of the clay, and, consequently, a better and more uniform product. The cars are hauled by horse power to the foot of an incline, where a wire cable is attached and it is quickly drawn up and the load dumped into an immense Enriens Disintegrator, from which it goes on to a belt conveyer and is fed into a roller crusher, thence into an open pug mill and into a Chambers

machine, from which it is forced in a stream or bar the width and depth of a brick and cut into proper lengths automatically by a Chambers cutting table. There are six Chamber's machines making in all an average of 350,000 brick per day. They also have a Little Wonder Brick and Tile Machine and a Cunningham Automatic Cutting Table making hollow brick or fire proofing. The brick are placed on iron cars holding 500 and run into tunnel dryers 84 feet long which work admirably. An oil burner is placed in an opening beneath the lower end of each tunnel and a low fire gives ample heat. Exhaust fans are run at the other end of the dryer (one fan for two tunnels) which draw the moisture laden air from the tunnel rapidly. The brick remain in the dryer 18 to 24 hours and come out bone dry. They are taken on the cars direct to



ordinary clamp kilns and burned with oil as quickly as heat can be raised and forced through them. There is no slow tedious process of water-smoking, as with most clays, but the heat is raised rapidly from the start and the burn completed in about 64 hours from the time the fires are lighted. The kilns are longer in cooling than in burning, it requiring 72 hours after the fires are drawn and the arches closed and daubed for the kiln to cool sufficiently for the brick to be loaded on cars, to which they are taken on barrows.

SOMETHING NEW.

One new feature of this department that attracted attention was an iron fire box; instead of building out from the arch with brick as is usually done, they have an iron frame or shell 24-inches long, 14-inches high, twelve inches wide at end which fits against the arch and tapering to 8-inches at the front end, where the oil burner is inserted. These fire boxes are easily made and have proven convenient and economical.

They are not effected by the heat, as might be expected, and after several months use show little signs of wear. By the old method the brick used are broken and destroyed, so that the iron boxes are much cheaper in the long run.

The brick are loaded onto flat cars standing on a track beside the kilns. It frequently happens that they handle one million brick in a single day, counting those made and shipped, and yet there is no apparent hustling, but instead everything seems to work easy and methodical. The Superintendent, Geo. H. Drew, is evidently the right man in the right place, while over all is plainly discernable the grasp of a strong hand—the ruling and direction of a wise master workman. Mr. Hayt and the writer looked critically at the "scrap heaps." There is a good collection of bats along the side track, but when it is remembered that this plant is turning out over 300,000 brick every day, six days in a week, this pile does not look so formidable. Their books show an actual delivery of 9,196,000 brick during the month of July, being the largest of any month in the history of the company.

A PLEASANT DRIVE.

By courtesy of Mr. Purington we were driven through one of Chicago's suburban thoroughfares, to the works of the Wall Bros., some one and one-half miles west of Purington. This is a plant we have heard much about, but have never before had the opportunity of visiting. The original plant was erected a few years ago by the present owners, regardless of expense and as a result, the buildings are of a much more substantial character than one expects to see for a brick works. The main structure is of



brick, two stories high and is 210 by 165 feet. Those of the fraternity who have grown bald by reason of low rafters would find this factory a pleasant con-

trast to what they have been accustomed to. No ducking or stooping is necessary. The cry of "Low Bridge" does not go here. Originally it was the proprietors' intention to make brick by the dry press process, and the machinery and equipment was provided, but did not prove satisfactory, and was discarded and stiff clay machinery put in. They are now running three Chambers machines, making 165,000 brick a day. They use tunnel dryers heated by steam and crude oil, and these with the machinery, etc., are all under one roof. They intended at first to burn with gas and built a furnace and generator, but it did not prove successful and was abandoned. They have evidently done much experimental work, some doubtless quite expensive,

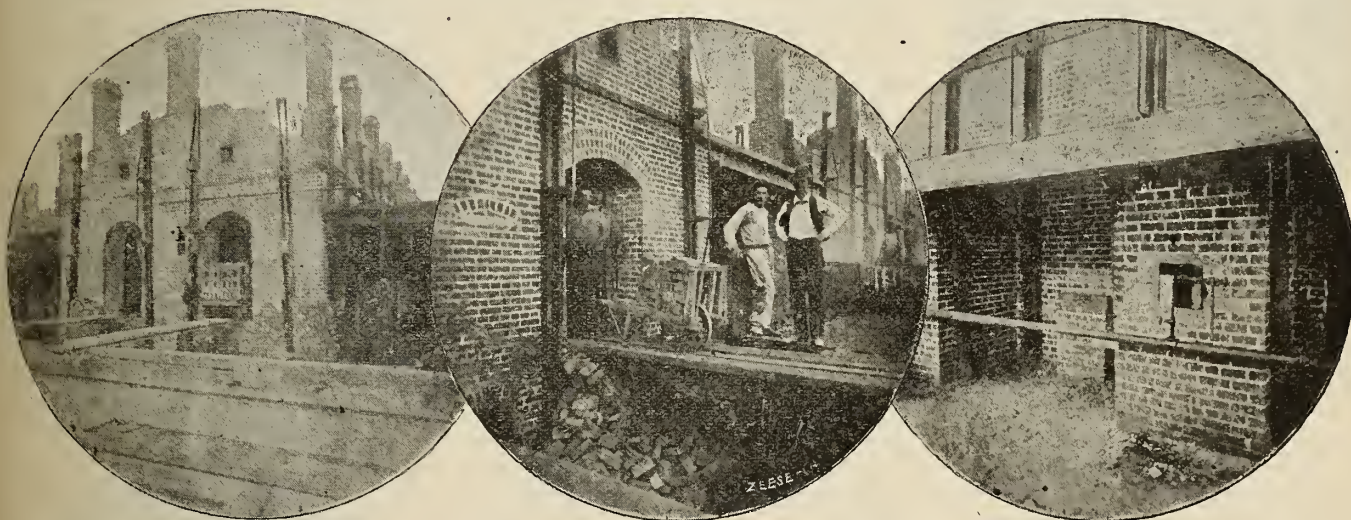
The removal of which was quite an expense, so he has made a virtue a necessity and is now making it into brick. The plant was erected under the direction of Mr. Thomas Trainor, who now acts as superintendent, and is very conveniently arranged. The clay is hauled in carts and is dumped from the top of an incline down to the foot of a belt elevator. Water is thrown upon it, and it is then shoveled onto the elevator which feeds it into a Brewer combined crusher and stone separator, and thence into a Brewer stiff clay machine with lubricating die and automatic cutter attached. (See cuts on page 164.) Mr. Hammerschmidt spoke very favorably of the machinery, which runs as steady as clock work, and easily turns

feet away had cracked the cement. They then built a metal reservoir of the ordinary pattern and have experienced no further trouble.

The plant was built in March last, and from the first, has been quite successful. The brick are shipped by rail and sold at \$6.50 to \$7.00 on board car.

A MODEL PAVING BRICK PLANT.

Three miles from Galesburg, Ill., nestled in a quiet valley by a little purring brook, where a few months ago there was little, if anything, to attract the attention of the casual observer, now stands a great manufacturing institution, the Purington Paving Brick Co. The president of the company, D. V. Purington, invited us to go with him to the works and see how paving brick are made. We



but they have the capital and brains to sustain them and are now making brick and are on the right road to success.

A NEW RURAL PLANT.

An hours ride on the Chicago and Northwestern Railway, and a very pleasant one, too, for we were accompanied by genial Will Gates, who has been called the Mark Twain of the N. B. M. A., brought us to the pretty, thrifty, hamlet of Elmhurst, near which Mr. A. Hammerschmidt has established a small brickyard. Friend Gates, who is now the proud possessor of a bicycle, acted as advance courier, and warned the natives of our coming. The glad look of mingled pride and affection that lightened the usually sad countenance of "Will" as he gracefully mounted his "safety" and sped away, amply repaid us for the lonesome walk from the station to the works.

Mr. Hammerschmidt has a fine stone quarry, above which is a layer of excellent clay, five feet or more in depth.

out 25 thousand brick a day. The brick are piled on double deck iron cars and run into an Iron Clad Dryer. There are four tunnels 100 feet long, in which the brick are thoroughly and rapidly dried, without the least checking. They now burn with oil in common clamps, but intend to erect permanent kilns in the near future. They are more than pleased with oil as a fuel as it saves both labor and expense.

STRUCK OIL.

An incident which may serve as a warning to others happened to them recently. On going to the quarry one morning, they were surprised to find it flooded with oil and at first sight were elated, thinking that some of the drills had penetrated a vein of that valuable product, but their delight soon changed to consternation, for they found that the oil came from their newly made tank, which was built after the fashion of a cistern with cemented bottom. The blasting at the quarry a few hundred

expected to see a fine plant, and was not disappointed. It is in very many respects a model plant and those contemplating the establishment of paving brick works may obtain some valuable pointers by a visit. There is no "wall" about the works, nor is a pass word or "order from the office" necessary to gain admittance; on the contrary visitors are welcome at all times.

There is an idea prevalent that the starting of a brick manufactory is, at best, a doubtful and uncertain experiment. That even where experienced heads and hands direct, the summit of success is reached only by a circuitous path strewn with wrecks, sometimes many and disastrous. If such is the common experience, the P. P. B. Co., is a notable exception, for from the beginning the work in all its details has been successfully carried on. When the buildings were up and the machinery in place a trial start was made. "Puff, Puff" went the engine, and 20 thousand

brick were made and placed in the dryer. From that on every thing has worked like a charm, and they are now making 150,000 brick on two Chambers machines every day, six days in the week, and at the close of this their first season, barring earthquakes, will have made 30 million paving brick. This success is exceptional and is due, not to luck, as some may think, but to the wise management of D. V. Purington, though he has been ably seconded in the enterprise by his brother, W. S. Purington, who is superintendent.



They have a splendid bank of clay or shale, which they are now working to a depth of 50 feet, and in a short time will probably go down to twice that distance. As they own 50 acres of this land, there is no danger of their running out of clay. There is a layer of soil on top of the clay two to four feet in depth, which has to be stripped off, and how best to do this is the problem that now puzzles them most. The clay bank is "shot" twice a day—at noon and in the evening. This is done by boring into it about ten feet with a 2½-inch auger, and a charge of dynamite (a two inch stick) inserted and two or more of them exploded by electricity. In this way a great quantity of the rock-like clay is thrown down. It is then placed in dump cars and hauled, two cars at a time, by a wire cable to a chute leading to the dry pans and crushers (see cuts on pages 156 and 157). By an ingenious arrangement the cars are dumped simultaneously in opposite directions, thus feeding the two machines from one track, which is located midway between them. The clay is ground to powder and elevated by belt to an open pug mill where a small stream of water is poured upon it from a pipe, and it then goes into a Chambers machine, is cut automatically into proper lengths at the rate of 172 a min-

ute, deftly turned on edge by the adjustment of a small belt and then carried forward and picked off and placed on iron cars by hand. This is the only handling of the brick until they are taken from the cars and tossed to the setters in the kilns. They are dried in tunnel dryers erected by the Chicago Iron Clad Dryer Co., in 24 hours and burned in Eudaly square down draft kilns, of which they have fifteen of 200,000 capacity each. They are arranged in a row, 14 to 20 feet apart, between two railway tracks, the bottom of the kilns being on a level with the bottom of the railroad cars, so that the brick are easily and quickly transferred from kiln to car. The space between the kilns is roofed over, thus protecting the arches, pipes, etc., from the weather, and the timbers which support the roof also serve as braces for the kiln walls. There are two openings in each end of the kilns large enough to admit a car of brick so that the cars as they come from the dryer are run directly into the kilns.

Here, as at the other Purington yard, oil is the only fuel used. Boilers, dryers and kilns are all fired with this fuel. There are four kilns under fire all the time, yet they employ but two burners—one day and one night man—and they have a very easy time of it. If the reader will think of the number of men it would require to fire these kilns with coal, and the hard labor incident to handling the amount of fuel required, it will be plain that there is a great saving here. The oil costs them less than 80 cents a barrel and is pumped from the tank cars to an immense reservoir placed above the level of the yard, thus feeding the oil to the service pipes by gravity.

The time required to burn the brick is six days and nights. They are thoroughly vitrified, and, when broken, present a flint like surface, and are of a beautiful dark red color and of ordinary standard size. Such brick, properly laid, make a pavement that will stand almost any amount of travel with almost no sign of wear.

THE ORIGINAL GALESBURGH PLANT.

In company with Mr. Purington we visited the works of the Galesburgh Brick and Terra Cotta Co., and the Galesburgh Pressed Brick Co., where identically the same class of brick are being made. They are running to their full capacity, with orders ahead that will keep them busy for months to come.

Both plants make by the stiff clay process and burn with coal. The latter puts them at a slight disadvantage compared with the Purington brick, the appearance of their product being badly discolored, while the brick burned with oil are clean and handsome.

LAYING THE BRICK.

Accompanied by Mr. Purington, we journeyed on to Moline, and Rock Island, Ill., and Davenport, Iowa. Three thrifty cities each of 20,000 to 30,000 population and so tied together by bridges, telephone and street railway wires, as to be virtually one city. They are also a unit as to the superiority of brick as a paving material and are putting them down on their main thoroughfares as fast as they can. At Davenport, we were taken in charge by Patrick T. Walsh, a true son of Erin, and one of Davenport's best known street contractors, to whom we are indebted for many courtesies. Mr. W. has put down a great deal of brick pavement and is a staunch advocate of paving brick, especially the Galesburgh brick, which, he said, had by actual service proven superior to any other. He then drove us about the principal thoroughfares of Davenport, many of which are paved with brick—the others will be in time—and called attention to several squares that had been paved last year with brick made in part of fire clay.



It so happened, that while putting down this pavement, the supply of brick ran out a time or two, and rather than delay the work by waiting till a new lot of fire clay pavers were received, the Galesburgh brick were substituted, as the latter are of a different color the contrast is marked. The brick are subjected to exactly the same travel, having been put down entirely across the street. The fire clay pavers are wearing perceptibly, while the Galesburgh pavers are

almost unmarked. Mr. Walsh drove us over one street where the brick pavement was being torn up to lay water pipes. As the pavement seemed new, we asked why the mains had not been put down before the pavement was laid. Mr. Walsh replied that the contractors preferred to take up and relay the brick pavement to digging up the old roadway. "No pavement," said Mr. Walsh, "is so easily laid, repaired or taken up as a brick pavement." We were taken across the river to Rock Island where Mr. Walsh has a contract for two and one-half miles of brick pavement on one street. The work is now well in hand, several squares being down. It is surprising how rapidly the work may be pushed. After the grading is done, a layer of crushed stone, 6 inches in depth, is put in and rolled firm, then four inches of clean, sharp sand is put on and compacted, on this a layer of brick is put on the flat, an inch of sand is spread on this, and a course of brick laid on edge, a sifting of sand thrown over it and the work is finished, and a smooth and comparatively noiseless pavement is obtained, that coming generations may count a valuable inheritance.

A SEVERE TEST.

A convincing proof of the durability of paving brick was recently afforded by the taking up of a strip of pavement at Sioux City, Iowa, which was put down by Holman Bros., of Sergeant Bluff, Ia., in 1887, and was the first brick paving laid in Sioux City. At that time, says the *Sioux City Times*, against the protests of newspapers and of hundreds of people who knew better, the city council was engaged in the frantic occupation of laying mile after mile of cedar blocks upon shaky hemlock planks, though plenty of history was cited to show them that almost before the first assessment was paid the ephemeral paving would grow putrid, rotten, unhealthful and utterly useless.

Holman Bros., to show that they could make paving brick equal to the best, and to demonstrate its superiority over other kinds of paving, begged to be allowed to lay a few yards as an experiment. The bricks, hard burned and somewhat smaller than ordinary building brick, were laid on the same planks as the wooden blocks. Two courses of brick were laid, the top course being on edge and the crevices filled with sand. That historic sample of brick paving has stood

the test, and, when taken up, appeared as smooth and durable as a stone sidewalk. When the laborers began to tear them up the bricks showed their wonderful durability. Even the steel picks, roughly used, chipped them but little. They were as good as when first laid, and may be replaced with little trouble or injury. It is evident that brick paving is the thing.

SUCCESS OR FAILURE

In business life depends to a great extent upon the early training one receives. As we advance in years a higher standard of ability is required in every department of commercial life. The time has passed when the unlettered youth, though possessed of more than average native ability, can step into and maintain a desirable place even in the ordinary walks of life. Especially is this true in the business world where close competition exacts not only diligence, but intelligence and skill.

A knowledge of modern business methods is as essential to success in brick-making as in any mercantile business, and the entered apprentices who expect to achieve success in this or any other line of clayworking must qualify themselves by thorough schooling.

This they can do easily, thanks to the many institutions of learning that offer the advantages of skilled instructors and careful class training upon terms that even those in moderate circumstances can afford.

One of the most successful of these is the Indianapolis Business University, whose announcement appears on another page of this journal. It is ably conducted by experienced men and offers every facility for carrying on the work in all its branches.

They solicit correspondence and will send a handsome catalogue to any of our readers applying for same.

Mr. John Jamison, of Newport, Iowa, has added a new brick and tile machine made by the Adrian Brick and Tile Co., but the tile business for a while has not been like the camel, "Jist a humpen itself." So, many tile factories, like Mr. Jamison's, are devoting their time to making brick. In nearly all localities but Davenport, Iowa, the brick business is way up, but there, as one brickmaker said, "Der vas, alreaty, not puiltling so much brick puiltlings, now, only liddle vood hauses, bud ven we git vonst a pig pad fire, dings might be differend."

LARGE QUANTITIES OF BRICK.

A *Tribune* reporter visited the works of the Sun Brick company Friday. The works are located at West Great Falls, about a quarter of a mile from the Great Northern round houses. At present they are under control of Mr. R. A. Masterson who also put up the Anaconda, Helena and Bozeman works. The machinery is of the newest and most improved pattern, being what is termed the Quaker outfit. It was manufactured in Wellington, Ohio, and is of the same kind as that of the other yards in the state. The engine is an Atlas and has 24-horse power. The machinery at present is running at a rate of 42,000 bricks per day, but owing to the inexperience of the workmen and other matters, only about 35,000 are turned out. One kiln of 120,000 has been burned and another of 200,000 is now in course of burning. Should the weather be favorable kilns of 300,000 and 400,000 will be burnt.

Mr. Masterson gave it as his opinion that this was the most complete and the best working plant he had ever built. The bricks are of a very superior quality. Some samples are now on exhibition at the office of E. W. Kelly on Central avenue and bears the test of hardness remarkably well.—*Great Falls Montana Tribune*.

FAVOR BRICK CULVERTS.

The highway commissioners of El Baso township, says the *Bloomington, (Ill.) Pantagraph*, are evidently a progressive set of gentlemen, and seem to be imbued with modern ideas. Every road in that township is well tiled and vitrified sewer pipes are put in at all the places where needed. The commissioners have now decided to put in solid brick circular culverts at all the largest of the small water courses, and on Saturday purchased 60,000 hard brick at Kappa for that purpose. These culverts, which are not at all uncommon in townships where the commissioners are up with the times are made in the shape of a perfect circle, just like a sewer pipe, only larger. When well made of hard brick they are almost indestructible and are practically everlasting.

H. P. Johnson, Secretary Arkansas Cotton Oil Co., Little Rock, Ark., would like to correspond with Paving Brick Manufacturers or Contractors who will bid for supplying and laying a mile of brick pavement in that city.

Man is but Clay.

"Man is but clay"—oh, words of truth
We learned, each one, in early youth;
Man is but clay.
We call the speedy man a "brick,"
The "soft-baked" mortal makes us sick;
Man is but clay.
Down goes a fellow with a thud;
We straightway say: "His name is mud,"
Man is but clay. —*New York Herald.*

EDITORIAL NOTES and CLIPPINGS.

Manilla, Ia., has a new brickyard.

Norwalk, Ohio, is to have a new paving brick plant.

Alex. Groff is making brick at Seymour, Ind.

The Idaho Springs Brick & Tile Co. is now under way.

Forestville, Sanilac Co., Mich., is to have a brickyard.

South Bend, Ind., is paving its main street with brick.

L. G. Metsker is running a brick plant at Federal Hill, Ind.

Wooster, Ohio, is soon to have a press brick manufactory.

A vitrified brick factory is to be established at Boulder, Col.

C. L. Alexander & Co. are making brick at Palmer, Mass.

Ft. Dodge, Ia., wants a pressed brick plant established there.

W. P. Chandler has started brick works at Farmerville, La.

The Riverside Brick Co., Bridgeport, Ala., is enlarging their plant.

E. F. Andrews, of St. Louis, will establish brick works at Quintana, Tex.

Large deposits of excellent clay and kaolin are found near Brigham City, Utah.

The Novelty Tile & Terra Cotta Co., Stoutsville, Ohio, has been incorporated.

The Standard Brick Co., Fostoria, O., has been incorporated; capital \$15,000.

It is claimed that there are large deposits of very fine clay near Dickinson, N. D.

The kiln sheds at the Lorillard brick works, Keyport, N. J., were burned recently.

D. H. Pershing and others will erect fire and paving brick works near Greensburg, Pa.

The Springer (N. Mex.) *Banner* says there is a good opening there for a brickyard.

Michigan City (Ind.) is beginning to put down vitrified brick on her principal streets.

The Fort Smith (Ark.) Paving Brick and Fire Clay Co. intend soon to enlarge their works.

Alton, Ill., is advertising for bids for paving some of her principal streets with vitrified brick.

Mosely Bros. and J. P. Bowers have organized the Prosperity Brick Works, Prosperity, S. C.

The kiln sheds at Jno. C. Coleman's brickyard near Dover Point, N. H., were burned recently.

The Kentucky Fire Brick Co., Portsmouth, Ohio, has increased its capital stock to \$300,000.

J. H. Millard, Oelwin, Iowa, is investigating brick machinery with a view of investing in a plant.

The Croswell Brick Co., will enlarge their plant near Detroit, Mich., to twice its present capacity.

H. A. Morrell is going to start his brick works near Pittsfield, Me., and wants men and wood.

Geo. Robinson is putting a new engine in his brick works at Bellaire, O., and will make other improvements.

The Anderson Pressed Brick Co., Chicago, had a \$2,000 blaze at their works recently, the result of a collapsing of a kiln.

Mr. Beattie, of Atchison, Kan., is figuring with Leavenworth parties with a view of establishing a paving brick plant there.

The York, Pa., brickmakers have had a prosperous season and are still busy, the demand being fully up to the supply.

The Anderson Common Brick Co., Chicago, has passed into the hands of a receiver. The liabilities are estimated at \$200,000. Assets \$150,000.

Geo. S. Bastian, of Williamsport, Pa., has organized a company and will establish a building and paving brick plant near there.

The Houston, (Tex.) Brick Works Co., are thinking of trying the dry press process and will be pleased to receive catalogues, etc.

It is reported that an Eastern syndicate has leased 2,000 acres of land near New Florence, Pa., and will erect fire brick works.

Ed. S. Kirby, Aransas Pass, Texas, is prospecting for clay and will establish a brick plant as soon as satisfactory location is found.

A. C. McClean, Chas. Olmstead and Frank Lindsey have organized a brick company and will establish a plant near Fostoria, Ohio.

The city engineer of Johnstown, Pa., John Downey, wants proposals for grading and paving with fire brick several streets in that city.

The firm of Halbeisen & Sanford, brick and tile manufacturers, Erlin, O., has dissolved and the new firm of Gsehwind & Sanford will continue the business on an increased scale.

The St. Louis Brick Mfg. Co., East St. Louis, Ill., has been incorporated by Chas. J. Leroy, Rich. T. Hill and Jas. T. Watson. Capital \$500,000.

Saginaw, Mich., is putting down its first brick pavement. If good brick are used and they are properly laid they will soon be calling for more.

Robt. B. Murdock, of Kansas City, and C. Newkirk and others of Sedalia, Mo., have organized a company and will build brick works near the latter city.

The W. S. Diekey Clay Mfg. Co., Kansas City, Mo., are in the market for a good tile and brick output. They propose to make paving brick and drain tile.

The Omaha (Neb.) Board of Public Works has decided to use brick for all further street repairs and improvement. No more wooden blocks will be used there.

Dodd & Co., have started a brickyard at Ludd, Ill. Their first kiln proved very satisfactory. A company will be organized to establish a pottery there. The clay is excellent.

Russell W. Bennett, of Okahumpka, Fla., thinks he has valuable clay lands near that place and wants to have the clay tested for brick and tile, and, if satisfactory, will erect a plant.

Geo. G. Cook, of Princeton, Ill., writes us that he has had an extensive experience in the manufacture of brick and sewer-pipe and also in enameling brick, and would like to correspond with some manufacturer desiring to engage in that branch of the work.

Borden & Selleck Co., of Chicago, have lately furnished the National Sewer Pipe Co., of Akron, O., a large line of Harri-

son Conveyers for their works at Portage, Ohio. The Conveyers are all complete, and are doing excellent service.

The attractions of a trip to Mackinac Island via the Detroit & Cleveland Steam Navigation Co., are unsurpassed. It only costs about \$13.00 from Detroit, or \$18.00 from Cleveland, for the round trip, including meals and berths.

F. Plumb, the well known drain tile manufacturer, of Streator, Ill., is enlarging his tile works and intends to start a large paving brick plant there. He may also add the manufacture of sewer pipe and fire brick, as they have an immense bed of clay of various grades, including some fine fire clay.

Willis L. Ringo, General Manager of the Ashland, (Ky.) Improvement Co., writes that they have a large amount of low-grade fire clay that they think well adapted to the manufacture of paving brick. They propose to have it tested, and if it proves satisfactory they will erect a paving brick plant.

W. G. Beverly, formerly of the Black Diamond Fire Brick Co., and L. C. Turley of Portsmouth, (O.) Fire Brick Co., have associated themselves with Geo. Davis, and will construct a large fire brick plant in Kentucky, where they have 10,000 acres of the land embracing some of the finest Kentucky flint clays.

The writer called on Mr. Cyrus Knapp of Terre Haute, Ind., at his yard and found him hustling. He has a ready sale for all the brick he can make, and gets a good price, as he makes a good article. He has dry sheds on the yard that holds 300 thousand brick, which are made on a Martin machine of 24,000 daily capacity. The McCue up-draft Kiln is used and is well liked.

The C. C. C. & St. L. Ry. (Big Four Route) is the direct and popular line to Cleveland, Lake Chautauqua, Buffalo, Niagara Falls, Thousand Islands, New York, Boston, and all points East and Northeast. Passengers via this popular line have solid vestibuled trains into the heart of New York City without transfer, and Wagner palace sleeping cars through to Boston. Before making arrangements for a summer tour call on or address the nearest agent of the Big Four Route, and obtain full information in regard to tickets, rates, and time of trains.

Our Knoxville, Tenn., correspondent, writes that there has been less activity in brick trade there since his report last

month. The Knoxville Brick Company has closed down temporarily and others are reducing their output. Building business dull, with prospect of a better fall trade. Knoxville has voted \$500,000 for improvements—\$250,000 for sewers, \$125,000 for bridges, \$125,000 for street paving. The paving brick men should be heard in this deal.

If you are contemplating a trip to any point in Missouri, Kansas, Texas, California, or any Western State, call on the nearest agent of the Big Four Route (C. C. C. & St. L. Ry.) and obtain full information as to rates, routes, and all other matters of interest. The solid vestibuled trains of the Big Four Route, making close connections in Union Depots, offer accommodations and facilities excelled by no other line. The dining car service of the Big Four Route is unsurpassed.

Mr. D. V. Purington, of Chicago, writes us as follows: "The Iron Clad Dryer Co. have taken out the trap used to return the condensed water from our Dryer at Galesburg and put in a pump in its place. The change acts like a charm and the average temperature in the Dryer has been increased 23° and it is drying brick much better than ever before and as well as I ever saw them dried."

All persons contemplating a trip to the beautiful Lake Regions of Wisconsin or Minnesota should ask for tickets via the Big Four Route (C. C. C. & St. L. Ry.), which is the only line between Cincinnati, Indianapolis, and Chicago running private compartment buffet sleeping cars, standard Wagner palace sleeping cars, and elegant reclining chair cars on night trains, luxurious parlor and cafe dining cars, on day trains, making direct connection at Chicago for all points in the North and West.

The pressed brick business in St. Louis is booming as it never has before. The St. Louis Iron & Machine Works has placed ten of their Lion machines in various yards there during the present season, which will alone increase the output 75,000,000. There is not a city on the continent so prolific of dry press brick machines as St. Louis, and interested parties can go there and see every machine on the market in practical operation. We are told that there will be a fine display of dry press brick machinery and brick at the St. Louis Exposition, September 2nd, and of which we may tell our readers more later on.

Poultney Biglow, who was a school-mate of the German Emperor, will contribute an article to the Midsummer (August) Number of *The Century* on the first three years of the Emperor's reign—the third anniversary of his ascent to the throne having taken place on the 15th of June. Mr. Biglow believes that "since Frederick the Great no king of Prussia has understood his business like this emperor," and in this article he gives what he considers the secret of the power of William II. with his people, and incidentally contributes many facts regarding his life.

This number of *The Century* will be especially rich in illustrated articles and complete stories, and the illustrations of Mr. Biglow's paper will include a number of views of the places at Berlin and Potsdam, and engraved portraits of the Emperor and Empress will form a double frontispiece.

M. R. Forney, of La Porte, Ind., reports the brick business in that section as unusually good. He is making about a million brick a year, using a Quaker horse power machine. He could easily dispose of a larger quantity but is well along in years and has other lines of business that require considerable attention, and, therefore, is thinking of selling or leasing the plant. To the right man a good opening is offered. The yard is located on the Erie Railroad and as there is a number of prosperous cities within shipping distance a large trade could easily be established. The clay is of good quality and there is plenty of it.

The West Springfield, (Ills.) Drain Tile, Building and Paving Brick Co., are running at about their full capacity, which is four million brick and two million tile per year. They have a splendid bank of clay, 15-feet deep, and an abundance of shale that they work at a depth of 6-feet. They employ 30 men. Have 4 "Dawson" up and down draft Kilns, and 2 Clamps. Have 1 Brewer Tile Machine, 1 Acme Brick and Tile Machine, and 1 J. W. Penfield Brick and Tile Machine, No. 7. They recently closed a contract with Ex-Congressman David Litler, for 15 miles of drain tile for his farm. The farm cost \$55,000 and he paid \$5,000 for tile, at the yard. They make a good article of paving brick that are extensively used on the streets in Springfield, for which they receive \$9. per thousand at their yard. They contemplate building four or more kilns for burning pavers, in the near future.

Dotterer's yard, Point Breeze Road, is among the Philadelphia plants that are still running. They operate a Chambers machine, and also make by hand. Edmund Dubois, the capable superintendent of this yard, has been tried by the fire more than one way, he having served his country for more than three years in the 2nd Pennsylvania Reserves, and learned the business of brickmaking when Hon. Jno. Wanamaker, the Postmaster General, was an off-bearer at the brickyard, located, about forty years ago, at 18th and Walnut Streets, now inhabited by swelldom.

Mr. John B. Morrison has just completed the construction and burning of three Morrison Improved Kilns of three hundred thousand capacity each, at Biltmore, N. C., on the works of Mr. Geo. W. Vanderbilt. In these kilns will be burned the bricks for Mr. Vanderbilt's mansion, to be erected near that place. A number of practical brickmakers and civil engineers interested in street paving bricks, declare the burning in these kilns the very best they have ever seen anywhere, being fully ninety-five per cent. hard brick, and nearly all of these hard enough for pavers. Mr. A. B. Wheeler, Jr., is general manager of the works. The Morrison Kiln has no rival for burning building and paving bricks in large quantities.

Our Philadelphia correspondent writes that the month of July in the brick trade was possibly the dullest the city has ever seen, yards that have previously continued through dull times are now working but little or not at all. One of the effects can be seen in the failure of the Trevoze Model Brick Company, which made an assignment for the benefit of creditors. It is believed that the liabilities will amount to about \$15,000, but the amount of money put up by the stockholders is considerable. The plant is located in Southampton Township, Bucks County and was started about one year ago. It is said that owing to the timidity of some of the stockholders to put the works in complete running order they were unable to make a success of the enterprise. A few days ago, before the failure, one of the stockholders made an application to the Court to have a receiver appointed, but this was refused, and, owing to the crippled condition of business, the assignment was decided upon.

MENTION THE CLAY-WORKER

When writing to Advertisers

MENTION THE CLAY-WORKER.

C. W. RAYMOND & CO.

A valuable catalogue has just been issued by Messrs. C. W. Raymond & Co., of Dayton, Ohio, for the use of manufacturers of pressed and ornamental brick, terra cotta, etc. It contains about 200 new and elegant designs for ornamental brick as well as many rules and hints for making pressed brick, which cannot fail to be of great value to the manufacturers of clay products.

It is sent free to brick manufacturers only.

WHY ONE MAN FAILED.

They were talking about newspaper work the other evening. The oldest man in the party, who is now doing something in the real estate line, said that he had tried newspaper writing and had given it up.

"I was always called a good writer at college," he said, "and I thought I had a good style. When I began work for myself I got employment with a circus manager.

"Can you write?" he asked.

"'I can,' I said.

"Well, I want a two-sheet poster that'll catch the town. Write one."

"And this is what I wrote, as nearly as I can recollect:

"This is the last week that Mr. Sawdust's great circus will be in the city, and every one should visit it at once. It offers to the public a number of admirable features, including several amusing clowns and many cleverly trained trick animals. The ring performance is highly creditable and consists of various acts by the aforementioned clowns and animals. There will be a number of interesting races between elephants and dogs ridden by trained monkeys. Mile. Comehigh, who has done very good work abroad, executes a dance on the bare back of a running horse, and also jumps through some ignited paper-covered hoops. Children and clergymen will enjoy the collection of wild beasts in the menagerie. The whole will conclude with an enjoyable exhibition of the Siege of New Orleans, the effect of which will be heightened by fireworks. Admission will be 50 cents for adults; children half price."

"That was about it. I turned it in and smiled, for I thought I had done well. The manager differed with me in a coarse and profane way, but for some reason or other he didn't discharge me.

He hired an ignorant man to write a new poster, and set me to work selling tickets. I stayed with him three seasons—until he went out of business—and at the end of that time I was one of the most proficient circus poster writers in the business.

"After he sold out I sought employment in a newspaper office, got it, and was set to work. My first job was reporting a fire in the Bowery. I can remember only the first part of my report. It started out in this fashion:

"The grandest exhibition of the fire fiend ever given. Thousands of spectators thrilled by the grand and overpowering scene. The untold wealth of the Indies was threatened at an early hour last evening by a grand and unparalleled holocaust at the corner of Bowery and Grand street. This great and throbbing artery of robust and living humanity was halted in its course. The streets were packed. The sidewalks were jammed. The flames started in the basement of the doomed building, and, creeping stealthily up the air shaft, burst out, amid the wild, hoarse cries of the multitude, from the front windows. Higher and higher they rose, now licking the pale sky with their blood-red tongues, now sweeping downward and enveloping in their fiery embrace the neighboring chimneys. It was a sight of a lifetime, and the crowd looked on with bated breath."

"While I was writing, the city editor came around and looked over my shoulder.

"What was the damage?" he asked, when he had read this far.

"About \$5,000," I said.

"Any lives lost?"

"None," I answered.

"All right," he said. "I guess you needn't finish that thrilling tale."

"All right, sir."

"And, by the way, he added, as I was putting on my hat, 'you needn't come back to-morrow. You need rest after that effort. Suppose you take a year or so, at your own expense. Good-night!'"

"The next day I went into the real estate business."—*New York Recorder.*

OR A BRICKYARD.

Alderman Push—We must establish parks, boulevards and the like, so as to give our town a metropolitan appearance.

Alderman Wise—We can achieve larger results at less expense by starting a smoke factory.

Passengers for the Eastern Cities, Thousand Islands, New York and New England River and Mountain retreats and Atlantic Coast Resorts, please bear in mind that the "Big Four" is the only direct route. Its Celebrated South-western Limited, Special New York & New England Express, and Limited Boston are composed of the finest Vestibule Sleepers, Coaches, Cafe and Dining Cars, and the schedule is so arranged as to bring passengers to their destination in the quickest possible time and at the most seasonable hours. The only line that lands passengers in the heart of New York City, giving passengers the privilege of stopping at Niagara Falls and a day-light ride on the beautiful Hudson River.

GO AND VIEW THE LAND.

Three Cheap Harvest Excursions.

On August 25th, September 15th and September 29th, Low Rate Harvest Excursions will be run from ALL STATIONS ON THE WABASH RAILROAD to the Great Farming Regions of the West, Northwest South and Southwest. Tickets good returning for thirty days from date of sale.

The crops were never so good as this year, and the Railroad Rates via Wahash, never so low. Whatever section you wish to visit, be sure and write to or call upon the nearest Wahash ticket agent for particulars as to rates, time of trains, accommodations, etc.

If you do not live adjacent to the Wahash, write at once to
F. CHANDLER,
Gen'l Passenger and Ticket Agent.
St. Louis, Mo.

SPECIAL. A practical ceramist with an European experience, thoroughly posted in the glazing and enameling of tile and brick, wishes to correspond with parties in view of forming a stock company for the manufacture of the above. Address for further information,
CERAMIST,
Care Clay-Worker.
82 c.

PATENTS

For INVENTORS. 40-page BOOK FREE. Address W.T. Fitzgerald, Attorney at Law, Washington, D.C. 8. 12. A.

THE MOST SUCCESSFUL Dry Clay Brick Machines

Are those invented and patented by Joseph J. Kulage.

For proof of this statement together with guarantee, etc., address

JOS. J. KULAGE,

1435 College Ave., ST. LOUIS, MO.

READERS!

Do you want the best Brick Machine, one that makes a superior quality of bricks and does it with the least amount of power, one that is capable of making as many as you want every day without having to spend all your profits for repairs?

If you do, then we are with you, and all you have to do is to try us. How about a Pug Mill or Crusher? We have lots of them in process of construction—cannot keep them on hands now for they are money savers when in use and the people want them. We build the best Tile Mill on the Market. Don't think because we are away out West that we can't reach you. We have five railroads, shipping in ten different directions.

The largest manufacturers of Paving Brick here know a good thing when they see it and have put in another "LEADER."

If you want anything in our line, write us. If you are in a hurry, telegraph us. We are now making a drive on Crushers and Pug Mills. Write for inducements.

Yours Truly,

THE DECATUR LEADER MFG. CO.,

DECATUR, ILLINOIS.

P. S.—Send your address on a Postal Card for our new printed matter.

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Keeping Up With the Times.

The FREY-SHECKLER Co., Bucyrus, Ohio, are enjoying an enormous trade in their large variety of Clay Machinery; nearly three times as large in January and February as during the same months in any preceding year.

The most notable increase is in Dry Pans, Pug Mills and Auger Machines suitable for making Street Pavers.

It is now fully established by numerous trials that first-class pavers can only be made by an Auger Machine. It is also an interesting fact, that over 60 per cent. of all pavers made in the United States are produced by the Frey-Sheckler Co's. Auger Machine.

It puts more clay in a cubic inch than any other method.

It works clay at just the proper temper to make a uniform, homogeneous brick.

All parts liable to break are made of steel. It makes as many brick in a day as can be taken care of. It has with it, as an essential accessory, the Neidergesaess patent lubricating die, which makes smooth surface, square corners saves power and lamination.

Another new creation that is finding favor with Brick-makers is the new patent cutting table. It is adapted to either side or end cut brick and its capacity fully 20 per cent. above any hand table heretofore used. The column of clay keeps constantly moving, is cut into side or end cut brick whilst in motion, and leaves no fragment to be thrown back into the brick machine.

It is too strong to break and constitutes an important complement to their excellent sets of brick machinery.

The substitution of a short, polished plate with a lubricating roller at each end, for the six or eight rollers that usually carry the column of clay from the die to the cutting table, is also a popular improvement by which the handling and frequent cleaning of the sticky rollers is avoided.

The two rollers really bear none of the burden of the column of clay, but only roll gently on its under side, spreading over its surface a thin coat of crude lubricant which they carry from the oil reservoir in which they run.

The company has several new and improved machines which they will introduce to the fraternity during the summer.

Their clayworking experimental station which they have erected during the past year at Bucyrus, Ohio, at a cost of over \$50,000.00 enables them to thoroughly test their new inventions before sending them to their customers' brickyards.

The interesting 29th Annual Catalogue of the Frey-Sheckler Co., Bucyrus, Ohio, will be sent free upon application.

Sec ad. on page 189.

THE CLAYWORKER.

VOL. XVI.

INDIANAPOLIS, IND., SEPTEMBER 15, 1891.

No. 3

Written for the Clay-Worker.

EXAMPLES OF AMERICAN BRICK AND TERRA COTTA WORK.

No. 41.

THE subject of our sketch is a gable for a school building, which was produced by the American Terra Cotta and Ceramic Co., of Chicago, to whom we are indebted for the photograph from which the accompanying illustration was made.

The design is a happy one for the purpose intended and is as full of tasteful art as such a subject could be, while the back ground of fancy work upon which the symbols are thrown in neat and graceful. The engraving reveals a distinctness and perfection of execution that could be made only with much difficulty and expense out of any other material. The piece is a specimen of architectural display that is seeking expression in many forms and in terra cotta may be brought within the reach of all.

Great care, however, should be

scraped out for perhaps a quarter of an inch in depth. The effect resembled that of some old wall which might have been built for hundreds of years, and was certainly as good as I could have got by using the high priced rough or mottled bricks that are so popular now-a-days, and at not over one-fifth the cost. How fashion has changed since the days, not so long gone by either, when Philadelphia pressed brick were considered the *ne plus ultra* of brick work! I remember seeing some years

caustic tiles. What was there so strange about their wanting more money for less work, after all, that their demand should be printed in a daily paper with a special heading? If they had struck for more work and less pay, that would have been worth talking about. But who is there that doesn't want "less work and more pay?" I think if every human heart were to be cut open, some such motto as that of the tile layers would be found graven in it. What was the word "Italy," which Browning said would be found carved in the core of the heart, but a more graphic and poetic expression of this deep-seated longing for less work and more pay? The land of sunshine and cloudless skies, of poetry, and beauty, and tradition, and romance, of lotos eating and dolce far niente, was what he loved and longed for; and when we say we want less work and more pay, we mean only that we want the things that "Italy" means to the poet who makes Italy his home. For my own part, I should never utter a protest against having a

taken by designers not to overstep good taste in ornamentation by designing florid or meaningless art forms, or rather forms without art, because that will have a tendency to reduce the natural craving for ornamentation in architecture to the level of a popular craze. The dividing line between art and caricature is very close, and, like the overloaded Byzantine style, might bring the whole into disfavor.

RECENTLY in laying up some brick-work I used the roughest, cheapest, and darkest hard-burned bricks I could find, laying them all up as headers, breaking joints in each course, using dark mortar, and having the joints

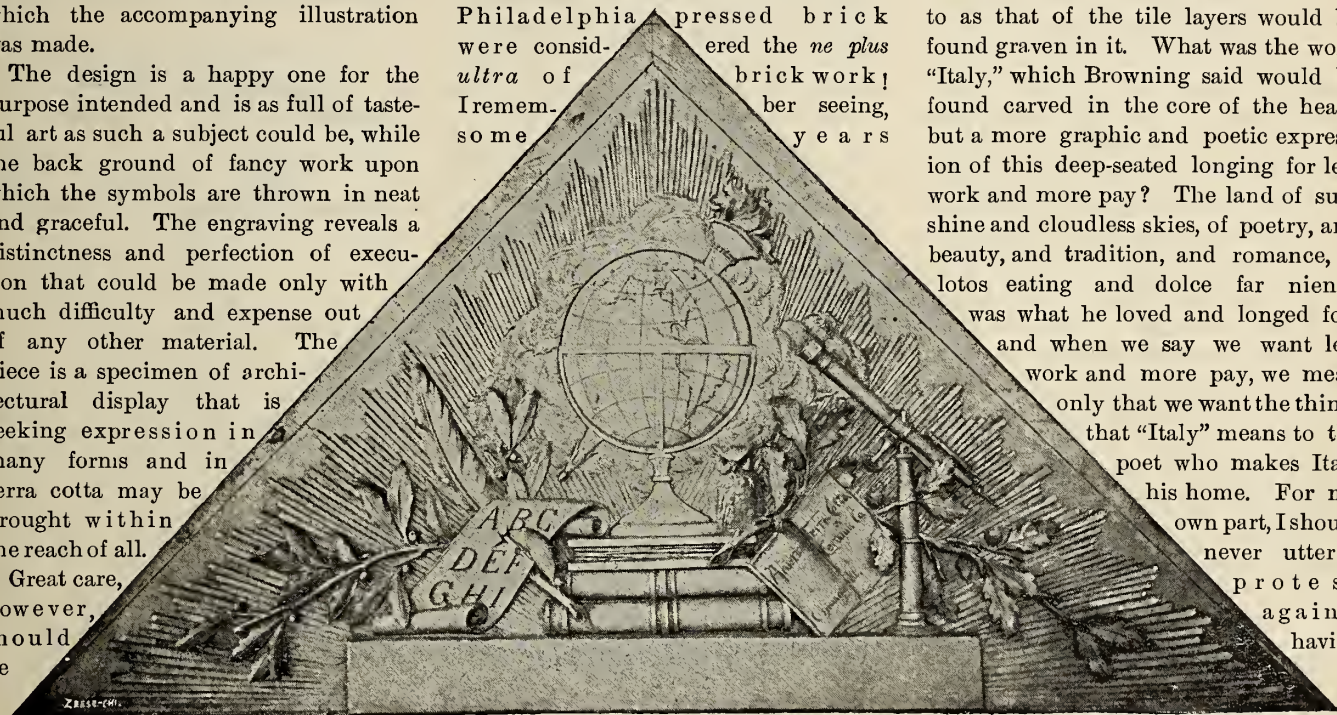
since, in a suburban town near London, Philadelphia pressed brick used as a trimming for houses built of the local English brick. They had been specially imported for this purpose, while nowadays the Philadelphia architects hunt far and near for rough and parti-colored brick as a relief to the monotony of the uniform deep red tones of the pressed brick.—*E. H. Brown in Architectural Era.*

LESS WORK AND MORE PAY.

I WAS struck by the heading over a news item in one of the papers the other day: "They want less work and more pay." "They" were the millers and millwrights, and the layers of en-

great deal less work to do and being paid a great deal more for doing it; but I shouldn't be willing, as so many foolish workmen are, to remain idle and get no pay at all, because I couldn't get just what I wanted in wages and work.—*Ex.*

EXPERIMENTS to test the strength of brick have demonstrated a crushing resistance of from 5,000 to 22,000 pounds per square inch, according to the quality of brick. The average of ten varieties was 7,150 pounds. As the standard strength given by the engineering textbooks is only from 500 to 5,200 pounds, it is evident that great improvement has been made in the manufacture of brick since those books were compiled.—*Ex.*



Never Talk Back.

Never talk back, such things is reprehensible.
 A fellow only corks himself that jaws a mau
 that's hot;
 In a quarrel, ef you'll only keep your mouth shut
 and be sensible,
 The man that does the talkin' 'll get worsted
 every shot!

Never talk back to a feller that's abusin' you—
 Jest let him carry on, and rip and cuss and
 swear;
 And when he finds his lyin' and his dammin's
 jest amusin' you,
 You've got him clean kerflummixed, and you-
 want to hold him there!

Never talk back, and wake up the whole com-
 munity.
 And call a man a liar, howsomever that's his
 fix;—
 You can lift and land him funder and with grace-
 fuller impunity
 With one good jolt of silence than a half a doz-
 en kicks!
 —J. W. Riley.

Written for the Clay-Worker.

ROOFING TILES.

SINCE writing the last letter on the subject of tiling I have been traveling through the middle and western parts of France, and have had some little opportunity of examining the tiling for roofs, the early history of which I have been writing about. I find the forms which I have mentioned, and others as well, in common use. The more I see of this kind of roof the more am I surprised that it has not come into general use in America. When one is able to ride for a half a day at a time and see nothing else than tile roofs, and especially in a country where there is not a little slate, he must be persuaded that nothing better can be afforded than tiling for roof covering. In some of the new buildings, which have some of the fancy touches on them, around Paris, and some of the watering places on the western coast of France we see, occasionally, slate roofs. They use them because they cost more, because there is a greater novelty connected with the use of slate. Just as some of our people in building extravagantly will sometimes use a material, not because of any inherent merit, but rather because it is unusual, because it varies from what is in common use; it is something which their neighbors do not have. But through the country, as well as for the most parts in and around Paris, the tile roof is every where to be found. As to the forms their number is legion. We see them on all the farm houses, excepting where there is an occasional thatch roof. We have no roof covering in America which has such universal use

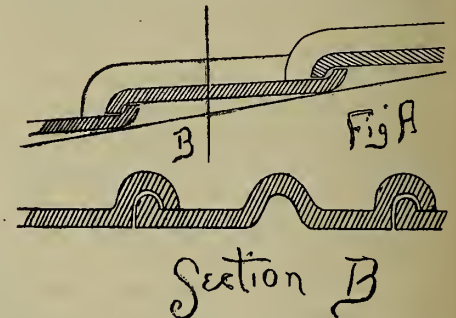
as the tile in the country through which I have recently traveled.

The invention of new forms for tile covering is not necessary. One can find, as I now know, nearly all of the patterns which I have illustrated as old tiling not only in use to-day, but being manufactured at this time. Their general constructive forms are the same. Matters of detail which have to do with appearance are various, but they never in any way effect the general principles of construction which are to be found in the various tiles which I have illustrated in the past.

People who buy roofing material in America are always more or less generous in regard to new materials. The writer remembers at one time when he was connected with the building of a number of large State buildings that the matter of roofing material came up for consideration, and that tiling among other coverings was considered. The writer explained to the board which had this work in charge, the general advantages of tile roofing. He represented that there was no material in use at this time which had so much good history back of it. He cited the hundreds of years of time through which it had passed and that such roofs are without evidence of decay where there is a standing structure. He cited all this and proved it by facts. He called attention to the fire proof qualities of the tile covering, how it is that a clay product is the only material which will stand all variations of temperature without being effected thereby. This was illustrated by stating that roof sheeting covered with tiling would in effect be protected as with a covering of brick. The disadvantages of slate were positively illustrated. We had some samples of slate in the office. They were subjected to a mild degree of heat, which at once destroyed them and showed what would happen in case of fire near a building covered with a slate roof. The tile samples were placed in a grate over a very hot fire and were not effected in the least thereby. Slate was farther attacked. We over-hauled some of the bills for repairing slate roofs on other state structures, and showed that on the basis of regular annual expenditures for such repairs that it would only take a few years to pay for an entirely new roof. After all this the board was ripe for the purchase of about three thousand squares of tile roofing. We visited the works of one of the leading establish-

ments where it was said they were prepared to show how easily and expeditiously a tile covering could be made. This company had purchased the patent for a tile covering and paid a large sum of money for it. The patentee was employed as superintendent at a large salery. However, he had never made tiles in merchantable quantities and had never given his roof a test. The Board went to this establishment, which was represented to be in running order. The machinery would not work, and there was not a tile made during all the time that they were in the place. Neither did the manufacturer have anything to show them except a few bits of tiling that were made some place else.

All this was a deadner. It made the Board sick of every thing that had been



said of tile roofing in the past. The slate men came in and said that the theory of tile roofing was all right but that the manufacture was a lost art. The Board purchased slate coverings for the buildings. On the other hand, if there had been anything in the way of a tile covering to offer they would have purchased.

It may be well to ask what kind of tiling was it that was offered, and how was it to be made? It was a long lapped tile something on the principle of a slate covering, excepting that it had under supporting ribs and ridges and decorating forms showing on the upper surfaces. The lap was almost as great as that on a slate roof. The tile was large and complicated, and while not particularly difficult of construction there was yet enough of complication about it to one who knew nothing about a tile roof to establish a failure.

We have given with these articles a large number of illustrations which represents a good deal of history in connection with tile coverings. In order that the mass of detail presented in previous articles may not be confusing, I may state that the different patterns are of only three general varieties. First, plates with upper turned ridges

on the margin covered with hollow coping with a sufficient lay and ridge to prevent the passage of moisture by capillary attraction. This is the class which belonged to the old Roman tiles, and which were illustrated in the first article of this series. Following this of second class, was a pattern of tile which looked not a little like a shingle tile. In making a shingle tile it is well to bear in mind that they should always be small, in order to burn well and be generally successful. For instance, in looking out of my window in the hotel, in which this is being written, I see a tile covering on the roof of a building which was built in the sixteenth century. The tiles show about 4x4½-inches to the weather, which size, however, could be increased with the methods of burning and kiln construction at this time.

Another form of construction is the short lap method, which has had more or less use during all of the history of tile covering and is used to a great extent in Paris and the provincial towns at this time. However, all forms are used. The short lap patterns is favored at this time because it is light. In the earlier periods this matter of weight was not important as all walls were made heavy enough for stones vaulted ceilings. This made the question of weight a very immaterial consideration, though short lapped tiles have always been used to some extent. One reason in all probability is that they are easily burned because of their general length, they being short, and then they are more economical. The tile in most common use at this time is of the pattern shown by Fig. A. It is to be noticed that the ends of the tile turn down at the upper end and up at the lower end, and that the next tile above comes down over in a way to make the passage of rain or moisture an impossibility. We find tiles of this pattern every place, on dwelling houses, public structures, train sheds, park buildings, in truth every place where we would use slate or shingles. In this pattern we have a form which appears quite picturesque. The ribs give good lines to the roof and present some of the attractive qualities of the round cover tile, which is everywhere so famous for its beauty. In the middle between the laps it is to be noticed that there is a raise. This has no particular constructive value, though it may have some advantages in preventing the warping of the tile in its

manufacture or concealing the warp if there be any. The width of this tile is about eight inches, and its length usually ten, though there is some slight variations as one would naturally expect.

The hips and ridges are covered with coping. They are usually laid in Portland cement which, in the case of the hips, is plastered in and pointed so as to make up for any projections formed by the natural contour of the tiling.

LOUIS H. GIBSON.

Le Crosic, July 24th, 1891.

(Copyrighted.)

DURABILITY OF BRICK PAVEMENTS.

BY IRA. O. BAKER, C. E.

UNDER this head we will try to find a relationship between the wear of brick-in the pavement and the traffic passing over it, and also try to determine a relation between the abrasion tests and the probable durability of the brick in the pavement.

§15. The brick designated No. 1 in the preceeding tables were taken from a pavement immediately in front of the platform scales of a coal and grain warehouse. Owing to the width of the scale platform, the wheels were limited to a portion of the pavement about one foot wide. The brick tested were taken from this most worn portion. Probably from one quarter to one half of the wear due to the feet of the horses came upon the same area as that worn by the wheels. It seems to be the prevailing opinion among brickmakers and citizens generally that the chief wear is caused by the horses' shoes. Intelligent engineers have estimated that one third the wear on city pavements in general is due to the horses' feet. A careful study of this particular pavement gave no indication as to the relative effect of the horses' feet and of the wheels. Probably this failure was due to the fact that even the wear due to the wheels was hardly perceptible. The driveway was level.

The pavement had been down thirty-nine months to a day, and in that time 30,734 tons and 54,416 horses passed over it, as shown from the records of the loads weighed. In other words, there passed over the pavement 13,604 loads averaging 0.62 tons. Each load was drawn by two horses. Excluding the effect of the horses' feet, the traffic was 15,367 tons *per foot of width*.

An examination of the surface of the bricks showed conclusively that the only effect of the traffic had been to wear off

the corners and edges of the bricks. This was checked by comparing the depth of the bricks exposed to the traffic, with that of those in unexposed portions of the pavement. The wear of the brick due to the above traffic was estimated, in volume, by five independent observers, the writer being one, and the agreement was astonishingly close. The average loss as thus estimated was 1.01 per cent. Owing to the greater ease with which the square edges of the bricks are broken off, it is probable that the greater part of this wear occurred during the first part of the time; but assuming that the wear was uniform, we see that if 15,367 tons wore off 1.01 per cent, then 15,250 tons per foot of width wore off 1 per cent.

§16. An interesting result was obtained by testing a half dozen "arch" or "eye" brick of the same manufacture as those designated No. 1 in the preceeding tables. The bricks tested was removed from a pavement for that purpose. They were much harder burned than those which the maker calls his best pavers, and were what would be called fully vitrified. The bricks were burned in an up-draft kiln with outside fire-boxes; and consequently the bricks were subjected, during burning, to medium drafts of cold air when the fire doors were opened. These drafts chilled the bricks and cause them to crack or check.

These bricks showed a modulus of rupture of 1,593 pounds per square inch, an absorptive power of 1 per cent., and a specific gravity of 2.19. To compare these results with those for other bricks, see Table I.

In the rattler the softer three of these bricks showed, for each half hour, one fifth less loss than that recorded for No. 1 in Table II; but all of the harder three broke up during the experiments. One of the three that did not break up showed cracks at the end of the third half hour which indicated that it too would soon go to pieces. By far the greater part of the wear took place along cracks or checks which were only revealed in the rattler. This is a very undesirable quality for paving brick, since it will cause the pavement to wear rough, which is undesirable in itself and which will increase the destructive effect of subsequent traffic. The breaking to pieces in the rattler seems to be fully accounted for by saying that the bricks were brittle. Do the above results warrant the conclusion that "arch" or "eye"

bricks are not suitable for pavements?

These bricks had been in a pavement in front of the platform scales of a coal and grain warehouse, for 19 months, during which time 23,263 tons and 42,996 horses passed over the driveway. In other words, there passed over the pavement 10,749 loads averaging 1.54 tons, and 10,749 averaging 0.61 tons, each being drawn by two horses. The traffic was 11,646 tons *per foot of width*, exclusive of the effect of the horses' feet. The bricks tested were taken from that part of the pavement over which the wheels passed. The pavement was on about a 5 per cent. grade, *i. e.*, the pavement had a slope of five in a hundred. One third of the loads were drawn up this grade and two thirds down it. As in the other case, the condition of the pavement gave no indication of the relative wear of the wheels and of the horses' feet.

Under the above traffic, 11,646 tons, the softer three of these bricks lost 0.97 per cent., or 12,000 tons per foot of width wore off 1 per cent., which agrees fairly well with the results above for No. 1. But the harder three had lost only about 0.2 per cent., with a possible (but not a probable) loss of 0.5 per cent. The brick were very rough when laid, so much so that the workmen had to knock off "the whiskers" before laying them. The greater value given above for the loss was deduced on the assumption that all the pieces broken out of the upper surface was due to the traffic. Probably not all of this loss was caused by the traffic, although doubtless some of it was. Notice that in either case the loss is proportionately small and directly opposite to the relative results obtained in the rattler for the harder and the softer of these very hard bricks. Unfortunately it was not possible at that time to make further experiments.

What does this difference of wear in the pavement and in the rattler indicate? The writer is not fully decided in his own mind, but is inclined to believe that these results show that brick can be burned too hard for use in a pavement. It is a common practice to specify that paving bricks shall be "thoroughly vitrified." Vitrified brick are always very hard, and generally also equally brittle and unfit for a pavement. There may be clays which make the best paving bricks when burned to vitrification, but the writer does not remember having seen any such. However, this subject is not up for discussion, and, besides, the proper course in this respect

is to apply tests to the finished product and leave the maker untrammelled in the method of manufacture.

§17. The brick designated No. 10 in the preceeding table had been in service for six years in a pavement which was carrying, *per foot of width*, a daily traffic of 15 one-horse vehicles, 7 two-horse vehicles, and 1 two-ton load. Making the usual assumptions, *i. e.*, that a one-horse vehicle empty or lightly loaded is equal to half a ton, and a two-horse vehicle empty or lightly loaded is equal to 1 ton, the above traffic is equivalent to 16.5 tons per foot of width per day. Therefore, the total wear on these bricks was equivalent to a daily traffic of 99 tons per foot of width for one year. Allowing 313 days per year, *i. e.*, not counting the traffic on Sundays, the total traffic over the pavement was 30,978 tons *per foot of width*.

It should be stated that in this particular case the above estimate of the weight of different vehicles—the one usually made in computation—assigns a weight considerably greater than the actual one. This assumption as to the weight of different vehicles originated in London, where it may have been correct; and it has been adopted in this country apparently without considering whether it correctly represents the facts. In the particular cases in hand, the one-horse vehicles were mostly light one-seated buggies, weighing probably about 0.3 tons each, while the average weight of the two-horse wagons was probably about 0.6 or 0.7 tons. If the traffic be reduced according to the last estimates, then the total is equal to 21,400 tons *per foot of width*.

To determine the amount the pavement has been worn away by this traffic, twenty bricks were taken from the center of the street, and another twenty were taken from portions of the side of the street where there had been practically no wear. Each lot was cleaned, dried, and weighed. Those from the center of the street weighed 6.0 per cent. less than the others. It was assumed that the lot from the side of the street represented the average weight of the bricks when they were laid, and that consequently the above differences represents the loss by wear. To check this result, pieces were chipped and filed from the sides of the brick that was down in the pavement, to an amount equal to the wear on the top surfaces. This step was checked by submitting the specimens to an intelligent man who was ignorant

of the purpose of the test. The brick were then weighed, and the loss computed, which was found to vary from 1 to 8 per cent., the average being 5.37 per cent. The value 6 per cent., found by the first method, was considered the more reliable.

If the first estimate of the traffic be assumed as correct, then 30,987 tons wore off 6 per cent.; or 5,166 tons per foot of width wore off 1 per cent. If the second estimate be taken as the correct one then 21,400 tons were required to wear off 6.0 per cent., and 3,560 tons per foot of width would have worn off 1 per cent.

§18. Possibly the following estimates, although not nearly as accurate as those above, may be of some interest. Brick of the same manufacture as No. 10, during fourteen years in a pavement wore off somewhere between a quarter and a half inch of depth. The exact wear can not now be determined, since the original depth of the brick is not known accurately. Neither can the traffic during the fourteen years be determined precisely at this late day. However, a careful consideration of all the conditions seems to show that the loss of this pavement was about 1 per cent. for each 6,000 tons per foot of width passing over it.

Brick No. 5 had been in a pavement for four years, during which time the wear was about 1 per cent. for each 9,000 tons per foot of width.

Brick No. 13 had been in service "near the middle of the street between two large wholesale houses for seventeen years," in a town of an average population of, say, 4,000. The writer has no knowledge as to the amount of traffic the pavement has carried. The bricks tested (they were not selected by the writer), showed very little wear, certainly not more than 5 or 6 per cent. and possibly not half that much.

RELATION BETWEEN SERVICE IN THE PAVEMENT AND WEAR IN THE RATTLER.

§19. Notice that according to Table II, brick No. 1 lost 0.8 per cent. during the third half hour in the rattler, and that brick No. 10 loss 3.7 per cent. In the rattler the loss of brick No. 10 was then 4.6 times as much as brick No. 1. Notice also that 15,250 tons (see §15) wore 1 per cent. from brick No. 1, while 3,560 tons (see §17) wore 1 per cent. from brick No. 10. In the pavement then, the loss of No. 10 was 4.0 times as much as brick No. 1; while in the rattler, then the loss of No. 10 was 4.6

times that of No. 1. Considering the nature and method of investigation, and particularly that the figures for the loss in the rattler are possibly considerably in error owing to omitted decimals, the agreement is reasonably close. This then is a fairly good check upon the preceding investigation.

Notice that brick No. 1 lost 0.8 per cent. in the rattler during the third half hour, and that in the pavement 15,250 tons per foot of width caused a loss of 1 per cent.; therefore, we may assume that the third half hour in the rattler was equivalent to a traffic of 19,000 tons (equal to 15,256 divided by 0.8) per foot of width of pavement. Or, we may reason backward from brick No. 10 to brick No. 1 thus: 3,560 tons wore "1" per cent. from No. 10, and since brick No. 10 lost in the rattler 4.6 times as much as No. 1, then the latter should require 4.6 times 3,560 tons or 16,364 tons to wear off 1 per cent. This is smaller than the result deduced above, but as the tonnage was more accurately measured in the first case that result will be used as the basis of further comparisons. 16,000 tons is the same as a daily traffic of 53 tons for 313 days, *i. e.*, one year omitting Sundays.

The wear of the brick in the pavement is due to three causes, the wheels of vehicles, the feet of horses, and the action of the frost, etc. The effect of the first two is about proportional to the tonnage passing over the pavement, while the last depends mainly upon the length of service and is therefore nearly independent of the amount of traffic. In the examples employed to establish the conclusion of the preceding paragraph, the traffic was comparatively light, and hence the effect of the weather was comparatively great; therefore, if the relation between wear in the rattler and service in the pavement as found in the preceding paragraph, be employed to compute the probable life of brick in a street having a comparatively greater traffic, any error due to the effect of the weather will be on the safe side.

(TO BE CONTINUED.)

THE POINT OF VIEW.—Editor: I think our July number is the finest issue we've ever had.

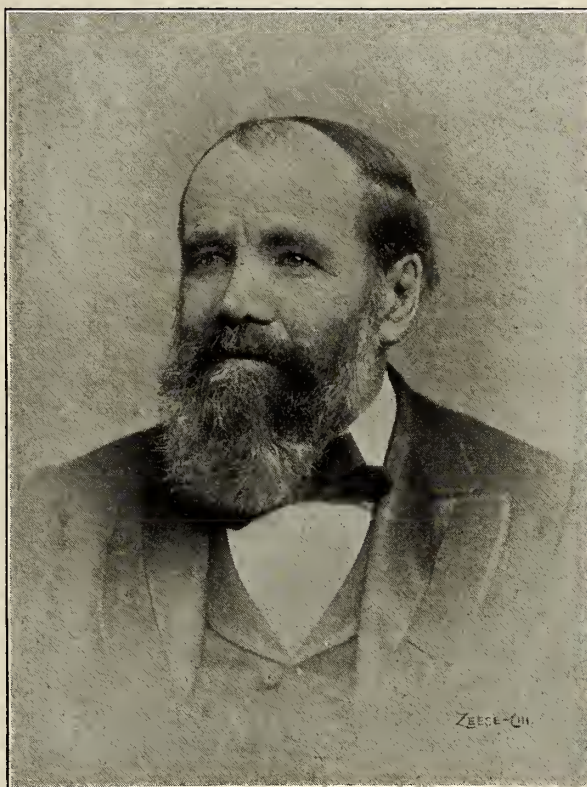
Publisher—I don't know about that. The Christmas number had a hundred more pages of ads.—*Brooklyn Life*.

BURNING PRESSED BRICK.

BY W. A. EUDALY.

THIS is one of the difficult tasks with many brickmakers. There are so many things to be considered. The defect in drying, setting and burning proper is not always discoverable until after the kiln is burned. The more perfect the bricks are dried the more perfect will they come from the kiln, and the same statement is none the less true in regard to the setting, other things being equal.

I have recently visited a dry press brick plant where the bricks are taken direct from the machine to the dry floor and hacked very close together from



THOMAS MOULDING, BRICK MANUFACTURER, CHICAGO, ILL.

eight to ten high, then covered with tarpaulins, blankets, etc., to prevent the air from striking them while green. Under this slatted floor are a number of steam pipes used to heat the floor and dry room. In this position and under these circumstances they are allowed to remain until taken to the kiln, which is most often done while they are still green, or but partly dried.

I have examined a number of kilns of these brick when burned and find the sides and often the fronts covered or streaked with a white mould, showing very distinctly the finger prints made when handling the brick in setting.

The strange thing is that the white shows more where the hand comes in contact with the surface of the brick, other parts of the brick often being free from stain. I suggested to the Manager that most likely these stains came from the way the brick were dried. He thought not. Still it is my opinion that these brick—being hacked one upon another from eight to ten high, and the hacks being very close together and being covered with a cloth covering, so that the moisture could not rapidly escape, and to add to these already unfavorable conditions, that of very little heat in the steam pipes or dry room—moulded in the hack, and if by good fortune any of the brick became dry before being set, the mould still remained on the surface and became visible when burned.

True, the brick did not show this discoloration, often one end of a brick was moulded or very much marked while the other end of the same brick was free from discoloration.

Again, it is not unusual to see in the same kiln two brick set side by side, one which was free from marks, while the other was almost, if not quite, spoiled. This argues to me that those bricks on the top or sides of the hacks in the shed became dry without moulding. But why is this marking so much more distinct where the hand or fingers come in contact with the brick? Some claim that the finger marking comes from the oil of the hands, others that it comes from the dirt and oil from the machinery, first coming in contact with the hand and transferred to the brick. I hardly think either of these theories correct, else why are not all the bricks so marked? Still, I have

seen pressed brick both from dry press and re-press machines that showed a white stain when burned that came from the oil that was used on the machine but this is not often the case.

I am firmly of the opinion that brick made from any clay will show white spots and streaks if allowed to mould in drying. Hence the importance of drying as rapidly as possible not to crack or damage the brick. Sandy clays are less likely to mould in drying for the reason that they usually dry faster without cracking. Usually, there is not enough attention paid to the drying.

When the brick are properly dried

they must be properly set. Bad setting will surely produce bad brick. There are many ways suggested, and in use, of setting pressed brick. And while about most things there is, strictly speaking, but one correct way, brick setting offers an exception to the rule. There are several ways of setting press brick. One would not think of setting the same in an up draft kiln that he would in a down draft kiln, neither would an experienced man set the same in all up draft kilns, to say nothing of the importance of setting different in different down draft kilns.

Three things must be borne in mind in setting in any kind of a kiln:

First, the brick must be set, if possible, to insure good draft.

Second, they must be set, if possible, to avoid marking or fire flashing the faces.

Third, they must be set so that when they settle or shrink they will not twist, roll, or break in the kiln.

There are a number of minor troubles to be avoided, but I think they come properly under one of the above divisions.

Many of the requisites necessary to be observed to produce the best results under one head, naturally tend to produce bad results in each of the others.

To illustrate, if the brick are set too tight in the kiln bad draft is the result, yet tight setting tends to avoid fire flashing. Again, if they are set with special reference to producing as many brick with both fronts as perfect as possible, they are liable to roll in the kiln. So that it is no small matter to know the proper setting for every kind of kiln and clay so as to strike the happy medium, thereby securing the best average results.

In an up draft kiln if the brick are not set reasonably tight on the top, you will have a greater per cent. of soft brick, and if set too tight on top, either by the platting or by setting the upper courses tight, you are liable to melt the arches or at least burn the brick much harder in the lower part of the kiln than is desired.

Recently I have built several plants of kilns where they desired to fire-mark, as much as possible, the faces of all the brick in the kiln.

Until of late years, we have exercised all our ingenuity to prevent fire marking, and in most localities we are still striving to overcome this same difficulty, while in others we are trying to fire-mark the faces of all we can. And as strange as it may seem to some, I much

prefer to undertake to burn without fire flashing than to burn any considerable proportion so as to produce the much sought fire flash.

Many manufacturers expect opposite results from the same kiln and methods of setting. Impossible. It can't be done. Every kiln and method of setting must be suited to the purpose for which they are intended, though the general principal may be the same. If you want fire flashed brick, set accordingly, and vice versa. We must not lose sight of the fact, that the setting plays one small part in the production of a large per cent. of good face brick.

It is unsafe to suggest methods of setting for the reason that what works well at one place might not be suitable to another. A few general suggestions may be safely made.

Press brick, either dry or repressed, should be set as close in the kilns as possible and have sufficient draft. The columns of three, five or eight, depending upon the method of setting, should stand upon a perfectly level floor, and perpendicular from top to bottom. In fact many of the best brick setters use a plumb-bob and straight edge. Each column should be squarely against its neighbor so that no space is left between columns. By the use of a long straight edge, reaching almost from side to side of the kiln, to prevent one column advancing faster than another, and the plumb-bob to keep each column erect and in line from top to bottom, and the diligent use of these instruments you may expect to have good brick soldiers that will stand well under fire and come from the kiln with clean faces.

Many brick setters use one or more courses of "binders" to tie the columns together to keep them from falling when the kiln settles. Nine times in ten these binders pull in two leaving a wide rent in the kiln, especially if the clay shrinks much. Avoid binding courses if possible. Others set three and four high, face on face before crossing, for the purpose of making as many brick with two good faces as possible. This is all well enough for sample brick, but of no practical use when the brick are laid in the wall of the building. The only advantage to be gained by this method is that if one face of the brick becomes damaged the other may remain good.

My experience has been that you will get more good face brick by crossing every two courses, one clay with another. While there may be exceptions to this

rule we think it a safe one to follow. I have often seen these columns, of three over three, or five over two, and so on, set in blocks, so that the upper row, or headers, in one column as you enter the kiln comes opposite to the lower row, or stretchers, in the adjoining columns. I have yet, however, to see much advantage in this method of setting.

USE THE STRAIGHT EDGE AND PLUMB-BOB, AND FIRE YOUR KILN SO AS TO PRODUCE A UNIFORM SETTLE ALL OVER THE KILN AT THE SAME TIME, and you will, in my opinion, secure better results than in any other way.

Though I have said little about burning proper, I feel that if more care and judgement were used in the drying and setting the burner would be relieved of many vexed questions, to say nothing of being discharged for failure over which he had no control.

Written for the Clay-Worker.

THE FUEL QUESTION.

No. 11.

RADIATION, CONDUCTION AND CONVECTION OF HEAT.

DEAR WILL:—I have, in former letters, repeatedly pointed out to you the losses of fuel from imperfect combustion, or, as Sir William Armstrong put it, before the meeting of the British Association at Birmingham, England, in September, 1865, when he said: "Many of the practices in vogue among the Manufacturers and Engineers were positively discreditable to this country. They not only neglected to utilize surplus heat, but they actually poured out unburnt fuel."

It is now 26 years since Sir William made this remark, and he could repeat it to-day, both in this country and in England, without committing himself. Setting aside for the present any further comment on this method of wasting fuel, I wish now to have your attention for a short time while I lay before you some other sources of waste, beginning with *radiation*. This is one of the methods by which heat is propagated. Let us then commence with definite ideas of radiation. The dictionary defines radiation as, "The division of rays of light; divergence or diffusion from a point like rays of light." Light is here mentioned to illustrate radiation, which is very good, for the laws of light and heat are, to a large extent, identical, and the two are so intimately connected, that, at the present moment, I cannot think

of any light that is not the result of heat. Now, without at present entering into the questions of what light and heat are, or how produced, let us confine ourselves to the consideration of the properties and laws which govern heat; and getting back to the property called radiation, we will enlarge a little on the definition of the dictionary, and say, radiation means not only divergence and diffusion, but it means diffusion and divergence in every direction alike; for instance, a hot cannon ball suspended in a room would diffuse its heat in every direction from its surface and with equal power in every direction, *down* as well as *up*. I single out these two directions because it is generally believed that heat *rises* in preference to going down, but such is not the case really. The air becoming heated rises and thus *conveys* upwards the heat rays that it arrested and absorbed; this apparently justifies the opinion of heat rising in preference to falling; but in a vacuum heat descends with the same facility as it rises, and, in fact, has no preference for direction at all, and would heat as quickly a body under the cannon ball, as another similar body placed above it at an equal distance. This law of equal diffusion holds good without the vacuum until the rays of heat meet with obstructions, which either deflect or absorb some of the rays. The atmosphere is one of these obstructions and first absorbs a number of the heat rays then carries them upwards; other obstructions *reflect* these heat rays, and in this way divert the rays from their original course.

To make the study of heat plain and intelligible you must look upon every substance known as possessing and radiating heat, *even blocks of ice*; you must, furthermore, consider "*cold*" as simply a *deficiency of heat*, and not a property itself.

We are accustomed to call things cold, or hot, by comparison only; there is no fixed point or degree where we can draw the line; the brick burner remarks to his mate, "It's a roasting hot day"—this refers to a temperature of probably 95° F. in the shade; then they go to the kiln they have under fire and here the same man remarks, "she is quite cold yet," and this refers to a temperature of 1,200° to 1,400° F., while steel melters commonly call a furnace "*cold*" that would easily register 2,500° F. In these

extreme cases we must always understand that the kiln or furnace lacks several hundred degrees of being up to the heat required, and this is the standard of comparison, and anything below it is called "*cold*." Thus you see the terms hot and cold are of themselves ambiguous, and very misleading.

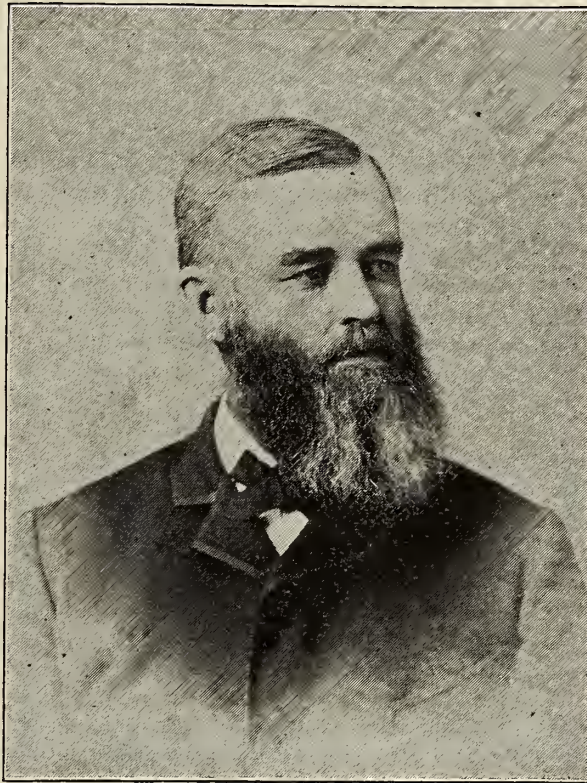
Radiation is one of the principal modes of heating and cooling bodies; a hot body in cooling, radiates its heat into space which is *conveyed* and *conducted* by the solids and air in its neighborhood until it has been cooled down to the temperature of the surrounding medium, then the radiation of this surrounding medium is equal to the radiation of the surrounded body mentioned

first which are not visible, but which affect the sense of feeling, and as they become hotter they begin faintly to strike the eye and when hotter still they emit rays of light which we call "*red*," and we then say they are "*red hot*." The bricks then are radiating both light and heat rays, a little later and they radiate more heat and *yellow light*; when the final intensity of the heat is reached, *white light* is emitted, and we consequently call it a "*white heat*." As the bricks cool off the shades of light darken and eventually cease to be visible, and we then have a "*black heat*." The temperature of solids may, as a general rule, be very nearly guessed by the color of the light they emit and an observant

burner is able to grade the heat very accurately by this method, in fact, this is an essential acquisition to every good brick burner and furnace man.

So far, we have spoken of heated bricks, etc., without referring to the source of heat or how the bricks became heated. Without going back to first cause, or the sun's rays during the carboniferous period of our globe, we will take the coal with its store of heat and follow it from the fire grate, up through the kiln of bricks. The coal on the grate, by burning, becomes a gas, which is *conveyed* up through the kiln by the draft; this gas contains all the available heat of the coal consumed in its formation and commences simultaneously with its formation to radiate the heat thus developed; the heat in this case is not emitted from a solid body but from ignited gas, or what we call "*flame*;" this flame then sends out rays of heat in every direction on its passage up through the kiln, or, if a down-draft kiln is under operation

the heat is similarly distributed as the flame descends. I need not tell you that the end of the flame is not the end of the heat for much heat is conveyed by the burnt gases beyond the end of the flame, these burnt gases also radiate their heat as they proceed through the kiln, and the bricks by *absorbing* this heat become heated, and, in turn, radiate their excess to the bricks behind them, they also *conduct* a portion of the heat by being in contact with other bricks; so that in a burning kiln all three methods of propagation of heat, viz., radiation, conduction and convection, are brought into play; reflection



GEO. S. TIFFANY, PRESIDENT TIFFANY IRON WORKS, TECUMSEH, MICH.

and this balanced radiation goes on and maintains the temperature of both at the same point.

To prove that a body will cool by radiation alone, it is only necessary to suspend a hot body, in the vacuum of an air pump when it will cool off rapidly although the means of convection and conduction are cut off.

When heat is propagated by radiation, it obeys the same laws as light; indeed, as I may now repeat, light and heat are very closely connected and appear to differ only in velocity.

When bricks or other refractory substances are heated, they send out rays at

of heat also takes place, of which I have something to say further on.

Now as radiation sends the rays of heat in every direction and in straight lines, it is evident there must be considerable confusion of rays in the arch of a kiln when full of flame and the confusion is the very thing that distributes the heat in the kiln, and is ably assisted in this by *convection*, caused, as I repeat, by draft. *Conduction* does not play a very prominent part in a brick kiln, as bricks are only poor *conductors* of heat, but readily absorb it under favorable circumstances.

In the case of generating steam in a boiler, the heat reaches the water by *conduction* alone, iron being classed among the moderately good conductors of heat, but after being conducted to the water by the iron, it performs the balance of its journey by *convection* chiefly; this is done by the water and the steam.

In referring again to the identity of the laws of light and heat, reflection may be cited, this being the same for both, viz., that the angles of incidence and reflection are equal. This may not be quite clear to you without an illustration and for this purpose place yourself in a line right opposite your mirror and you find that the light radiates from your face, etc., goes in straight lines to the glass and is reflected straight back to you, hence you see yourself reflected in the glass, but step aside a little to the left and let your brother place himself just the same distance to the right of the line as you are to the left, and now you see not your own face reflected in the glass, but your brother's, and he sees not his own face, but yours; if the angles are not equal on each side of the line right opposite the mirror you will not see each other in the glass, he sees you, because rays of light proceeding at an angle of say 30° from you and falling on the glass are reflected just 30° on the opposite side of the glass and thence strike him, and you see him by the same rule. Now heat is reflected by precisely the same law; but you must not infer that the same surfaces will reflect light and heat equally as to quantity; in other words, a surface may reflect light perfectly and absorb heat nearly as perfectly, which means it would scarcely reflect heat at all, as a rule, rough surfaces absorb both, while smooth polished surfaces reflect both. Condition of surfaces is a great factor in both reflection and absorption of light

and heat. As a practical illustration of this point, take a new kiln for pottery, sewer pipe, etc., or a heating furnace, and these kilns or furnaces are never in first-class trim until the inside walls are *glazed*; they then, instead of absorbing heat, reflect it back on the goods to be heated and this quickens the working of such furnaces or kilns. This is verified every working day in the year at one place or another and every good puddler heater and steel melter is aware of the fact, although a large majority of them are no doubt ignorant of the why and the wherefore of it.

It might not be out of place to suggest to the common brick manufacturer the advisability of trying this glazing plan with his ordinary kilns and with the walls under his boiler, in fact, I think the glazing of all inside walls of kilns and furnaces generally would be attended with advantage and this could easily be accomplished in most instances, by giving the walls a coating of fusible "wash" which would vitrify with the first suitable heat raised. Such an experiment would cost little, and if carefully carried out and fully recorded in the columns of the CLAY-WORKER would doubtless benefit the experimenter and the readers of the CLAY-WORKER generally.

One of the most important points about radiant heat is the rapidly increasing loss of heat by distance from the source of it. The law is, *that the loss increases as the square of the distance increases*; for example, if a brick be placed at a distance of one foot from the source of radiant heat, and another be placed two feet, and a third be placed three feet distant; the third will only receive one-ninth as much heat as the first, and the second will only receive one-quarter as much as the first. This law holds good, and is equally important for light. If you are reading with your book at a distance of two feet from the gas or lamp and you move to a distance of four feet, you must read with only one-quarter of the light you had at two feet, and if you move to a distance of six feet you only get one-ninth of the original light. All this is easily proved, but I think you will be able to prove it for yourself, if you cannot I will. I have already shown you that the laws of reflected light and heat are identical, but, so far, only alluded to plane surface reflectors; the same laws hold good with curved reflectors, for heat rays may be changed from divergent to parallel or to convergent by

suitable concave reflectors, or they may be made more divergent by convex ones.

Heat also obeys the laws of refraction when passed through suitable lenses. Prof. Tyndall informs us in his works that "M. Faraday has fired gunpowder by converging the solar rays upon it by a lens of ice." Think of heat passing through ice and firing gunpowder!

This brings us to another striking resemblance between heat and light, viz., that property of passing through some substances unabsorbed. When we speak of light passing through a body, we say such a body is more or less *transparent*, if light will not pass through at all we then call such a body *opaque*. Some bodies are also transparent to heat rays and some are opaque. Transparency to heat is called *diathermancy*. Absorption of light and heat rays is the cause of opacity to these rays, and non-absorption the cause of transparency and diathermancy. It does not follow, however, that the two go hand in hand, for a transparent body may be, and is, often wanting in diathermancy. Glass transmits nearly all the light but absorbs a large percentage of heat rays, and the same may be said of clear water, it readily absorbs heat rays but allows light to pass through it nearly unobstructed.

I commenced this letter with the idea of showing you the chief characteristics of radiation, conduction, and convection, but have so often digressed until my letter is up to its usual excessive length and the subjects only slightly touched on. A great deal more may be said of radiant heat; I have by no means exhausted this portion of the subject, but shall lay it aside for the present and in my next take up the other two parts which I have incidentally mentioned several times in this letter; before closing, however, I want to show you the importance of *flame* in brick burning, steam raising, iron heating, and all such industries where high temperatures are required, and the products are not injured by contact with the flame.

Flame then is the great distributor of heat, and on its presence depends uniformity of heating, without it we have what is known as *local heating*, or, heating in one place, and the decreasing of heat with the distance from the fire in the ratio I have shown you above. Intense local heating boilers results in burnt crown plates, leaky seams from unequal expansion, and deficiency of steam, although an excess of fuel is being used.

In a brick kiln intense local heat means arch bricks burnt to a clinker and several of the top courses salmon—some of them very salmon. As I am anxious you should fully comprehend the law as laid down in those eleven words in italics above, referring to light and radiant heat, I would advise you to experiment and work out a few examples yourself, until it is firmly set and rooted in your mind. You might experiment with a piece of square card board by holding it at different distances from your gas light or lamp and measure the sizes of the shadow it casts on the wall, for the nearer you are to the light the more rays it will obstruct and consequently cast a larger shadow in proportion. You can thus verify the law as stated. Yours Paternally,

HYDRO-CARBON.

Written for the Clay-Worker.

BRICK AND POLITICAL ECONOMY.

BY J. W. CRARY, SR.

A WRITER in the July CLAY-WORKER wants more brick literature. He wants a "treatise on brick as a building material." I would refer him to the back numbers of the CLAY-WORKER, and to the books the CLAY-WORKER advertises for sale, then let him take a look at all of our big cities, which are built almost entirely of brick; and he won't find much left to be said, about brick as the best building material. I will not ask him to go to the *Old World*, or wade back in history 4,000 years, to Babylon, to Greece, to Rome, and all the modern cities of Europe. Then our friend wants "items of cost." Ah! here is the question! And it has been the question, and will still remain the question, as long as a "balloon" framed house can be built for two-thirds the cost of a brick house, of the same dimensions. As I happen to know something about building, I will inform my friend, that, as a general rule, the average difference between brick and wooden building, of same size, kind, and dimensions, is thirty-three per cent., or about one-third of first cost, in favor of the wooden building.

It requires no literature to show that brick, as a substantial building material, is incomparably superior to all other kinds, and as to the items of cost, it is simply a matter of figures, when a plan and specifications for a building is presented. For instance, if a good six roomed dwelling, constructed of wood, is made in style and finish to cost six hun-

dred dollars, then add three hundred, and a brick house in same style, finish and size, can be built for nine hundred dollars.

AS TO THE QUESTION OF HEALTH AND COMFORT OF BRICK HOUSES

There has much been said. It has been a vague notion, of those who never took the trouble to study and understand the question, or, perhaps, did not have the mental capacity to do it, to think that a brick house is much more damp and chilly than a wooden house. A very little thought will at once dissipate this notion. If we take a room of a given size, and ventilation in a wooden and a brick house just alike, we see that humid or damp air, will enter the rooms in the same way, and quantity. Now, if the brick walls are not "furred," and the plastering is cooler than the air, the water in the air, to some extent, may be seen condensed on the walls, but if the walls are "furred," or if the inside part of the walls are built so as to leave a space between the inside and outside part of the walls, then the plastering can be put on the brick, instead of lath and the cold temperature of the outer walls, will not affect the inside "shell," or walls. All brick walls should be built hollow, where either fire or dampness is a question.

A wall three brick (13 inches) thick, can have the inside course set in three-quarters of an inch from the outer courses, without in any degree impairing the strength of the wall, and if the walls are only one brick, or nine inches thick, the inside brick can be set on edge, and with proper "bond headers," the wall is just as strong, as if it were built solid. I have built several first-class dwellings in this way, and found the very best results in all respects.

THERE CAN BE NO QUESTION ABOUT BRICK AS A BUILDING MATERIAL.

The only question is the question of economy. Now, if we figure a little, we can decide the question of cash economy. The difference in durability between a brick and a wooden house cannot well be found by any rule of testing the material of which it is built. So far as we consider the brick, of the brick house, there can be no comparison. The *life* of the average wooden building is about thirty years, and a part of the wood in a brick building is the same; but the brick being everlasting, the comparison stops at thirty years.

Now, if we take a wooden house which cost in building \$600, we must pay \$12 a year to have it insured, this would be

\$360 for thirty years, without interest; insurance added to cost equals \$960; repairs on wooden house for thirty years equals \$360, added to first cost and insurance equals \$1,320. First cost of brick house \$900, insurance for thirty years equals \$120, added to cost equals \$1,020, repairs added equals \$1,140. So we find that at the end of the life of the wooden house, we have paid out \$1,320, which is a total loss, save the old lumber. If we estimate this at \$100, our clear loss is \$1,220. Now, if we spend \$300 in repairing the brick house, we find it as good as when new, and we have saved just \$820 of our investment, while we have lost \$1,220, by using wood instead of brick for a building material. All business men and builders will see that my estimates are about right, being, perhaps, a little too liberal towards the wooden building.

ALL PECUNIARY LOSSES MUST BE PAID BY LABOR OF MUSCLE OR BRAIN.

I have asserted in former articles that the difference between the cost of insuring brick and wooden buildings in the United States is at least one hundred millions of dollars annually. Now the greater loss, by decay, of wooden buildings over brick, is at least fifty millions of dollars annually. Does this not enter seriously into the question of political economy? This vast amount would soon pay for the construction of a shore line, navigable water-way, all around our coast, from Maine to Mexico; thereby placing our light warships and merchant marine beyond the reach of an enemy. It would put our rivers and harbors in good condition. It would build great double track railways North and South, East and West across our country, and regulate transportation by allowing the railways to be used by competitive companies, which would pay a royalty or toll to the Federal government; or it would erect all of our public buildings; or it would aid our public schools, so that all citizens would be educated under a proper curriculum to understand political economy, so far as their rights and duties as citizens are concerned. It would do any one as much as all of these things, and, to a great extent, stop the prodigal waste of our forests. Terra cotta, brick and a little iron, are all that is needed to construct the best buildings in the world, from a laborer's cottage to the greatest or grandest structure needed.

It cannot be denied that much of our insurance policy is in a demoralized condition, and the more inflammable

our building material, the more danger to the morals of our system of insurance. Give us plenty of honest brick and terra cotta work, and we will learn a salutary lesson in political economy.

Written for the Clay-Worker.

BRICKMAKING --- OPERATIVE AND SPECULATIVE.

BY BRIX.

THERE are many brick manufacturers who are not realizing on their investment, for the reason that they have gone into the business without giving the matter the same consideration they would in almost any other branch of manufacture. They have spent money lavishly for site, rail tracks, clay hoist, engines and machinery, and then acted as if the sum of their trouble was ended. How many of you have stood by and seen the engine move off with a majestic sweep and the machine begin to deliver? Your eyes sparkled at the prospect and you were jubilant. You rejoiced at the perfection of the price of green clay, moulded or pressed into the shape of a brick, and were ill at ease if the machine was idle for a moment.

Most men engaging in business are usually cautious in regard to the small details. But among the trades and business men engaged in manufacturing, I certainly have reason to think that the clay business has more enthusiasts, more men who have allowed themselves to be led astray in their calculations, than in other lines of work. This is because the green or unburned brick is not the finished article. Most products after leaving the machine are more than half completed. Some are turned out of the machine finished and ready for packing or shipping, but the brick has just begun its course.

I want to call out to those who are working on that plan, "Begin at the other end of the Business." Make your outlay as low as possible on the molding of the bricks, whether it be done by soft mud or dry clay, by hand or by machinery, but see that you are provided with the best method of burning your product. Don't expect to succeed in your brick-making until you know they will be burned into a good, salable and imperishable product.

We frequently hear a lament from some poor brickmaker after a heavy rain or wind storm or flood that has destroyed from 50,000 to 300,000 green bricks that were in kiln and just ready to burn. We

seldom hear anything about the kiln of bricks that when opened, after being burned, turns out one-half or two-thirds, and sometimes altogether, salmon bricks. The loss of the green bricks was not nearly so much as the poorly burned kiln, which usually stands there as a perpetual reminder of unskillful work, or mismanagement, or ignorance of the art; call it by what name you like. The proprietor who has these monumental evidences, of his having begun at the wrong end of the business, says but little about "a bad burn" and does not feel in a happy frame of mind.

We hear the remark through the clay journals that there is a perceptible improvement among brickmakers, in the burning of their wares. This is true only so far as to those who have been possessed of ample capital to invest in the whole line of modern improvements, and are fitted with machines, driers and kilns. I want the brickmaker of small means to look beyond the machine, and see the kiln. There is where his money is made or lost. But few manufacturers scruple to spend from \$2,000 to \$10,000 for buildings, engines, and machines, and fixtures, who do hesitate and find fault, and halt, at the expense of a kiln costing a thousand or fifteen hundred dollars.

The machine run to its full advertised capacity will require a large bill of repairs, while a kiln well built, and properly cared for, will require less cost in one year than the machine will in one month. The saving in labor, in fuel, in loss, in extra scoving, and certain results in the work, are far ahead of machines in their saving of expense.

I do not mean in this to decry the use of machines—far from it.—But ask you to look the matter up and see wherein the largest brick companies have their strongest points. I say unqualifiedly, "The Burning" is the principal one. If they are certain of the result in that respect, they can sell their ware. If they lose in this department two burns in five, or have only one-half, or three-fifths of their output for sale, they will shut up shop and quit.

REPETITION IN ADVERTISING.

SUCCESS in advertising is gained by persistence in its use. The public eye may be photographic, but the memory of the average man, like his stomach, needs continual attention.

Nothing is more deceptive than the public memory.

It is a slate, on which the wet sponge goes as often as the pencil, and what to-day is a figure to-morrow may be a blank. This is the material on which advertising has to act, and the science of handling it rightly is really the secret of successful advertising. This is practically illustrated in our political campaigns. On every township corner the names of candidates are announced in the largest of letters and the most pyrotechnic of colors. Everything is bold and big, and newspapers and orators do their level best in keeping the public memory in a healthy and receptive condition. This is advertising with a vengeance; but when the object is realized the orators are dumb and the papers blank, and it may be safely asserted that in two years time the average man would be unable to name the officials for whom, perhaps, he carried a torch and mutilated his conscience and his shoes in electing. The same law holds good in business advertising. It is inconsistent to suppose that the advertisement of a year ago is pinned up in the public mind for a permanency. The man who thinks it is usually finds out his mistake.

We cannot secure a succession of crops, either in business or turnips, if we neglect the indispensable formula of sowing the seed. The most successful men in business to-day are those who are not blind to the important fact that persistent advertising is the only kind that pays. Intermittent and spasmodic splashes in printers' ink and an occasional splurge in woodcuts and chromos may meet with temporary and isolated instances of success, but as a general rule are dollar hook for penny fish. It is a matter of both common sense and experience that in advertising and making business, as in fixing a latch or hanging a picture, it is as much a question of the hammer as the nail. Business success is not obtained by patent but by patient and persistent effort in which advertising counts as an indispensable factor.—

Pittsburg

Budget.





OFFICIAL ANNOUNCEMENT.

Sixth Annual Meeting of the National
Brick Manufacturers' Association,
to be held at Washington, D. C.,
in January, 1892.

To the Members of the N. B. M. A.:

GENTLEMEN—In addition to the formal requests presented at the last convention by members from Zanesville, Ohio, and Sioux City, Ia., asking that the next annual meeting be held in their cities, we have recently been honored by the following invitation from the craftsmen in and about the National Capital:

WASHINGTON, D. C., Aug. 31, 1891.

TO THE EXECUTIVE COMMITTEE,

NATIONAL BRICK MANUFACTURERS' ASS'N:

We, the undersigned brick manufacturers of Washington and vicinity hereby extend to you a most earnest invitation to hold the next annual convention of the N. B. M. A. in this city in January, 1892, and pledge our hearty co-operation in the great work. We believe that our city offers unrivaled facilities for the entertainment of guests and as our brick manufactories are among the largest in the country, almost every known process of manufacture being in operation here, where the craftsmen may inspect them and make comparison as to the relative merits of the different processes, we feel confident that the best interests of the Association and the clayworking craft generally will be advanced by your meeting with us. We, therefore, beseech you to give our invitation favorable consideration, assuring you that if it is accepted nothing that we can do to facilitate the work of the convention and make the craftsmen's visit to Washington both pleasant and profitable will be left undone:

WM. H. WEST & BRO.

W. T. WALKER & CO.

ALBERT GLEASON,

Pres. Ivy City Brick Co.

WM. C. MORRISON,

JOHN E. HERRELL & CO.

MARTIN & BRO.

JAS. H. RICHARDS,

A. RICHARDS & CO.

THEODORE L. HOLBROOK,

Pres. Wash. Brick Machine Co.

CHILDS & SON,

HIBBS & JONES,

CHAS. FORD,

L. CLEPHANE,

Pres. Va. Brick Co.

J. D. SMALL,

Pres. New National Brick Co.

C. R. MONROE,

Mgr. Capt. Hill Brick Co.

No City in the Nation is more attractive to men of all callings and walks of life than Washington. No American City possesses so much of general interest, and we feel assured that the cordial invitation of the Washington brethren will meet the favor of the craftsmen throughout the Nation and result in the

largest gathering we have yet held. We therefore, accept the invitation to hold the sixth annual convention at Washington in January, 1892, and will make announcement subsequently of the exact dates and the arrangements for reduced railroad rates, hotel accommodations, etc., etc.

Craftsmen desiring information as to the scope and purpose of the Association, requisites of membership or reports of previous conventions are requested to address the Corresponding Secretary, T. A. Randall, Indianapolis, Ind.

We urgently request all American brickmakers to identify themselves with us in the effort to stimulate progress and aid in the advancement of the entire craft.

Very Respectfully,

THE EXECUTIVE COMMITTEE.

J. C. ADAMS, *President*

T. A. RANDALL, *Cor. Sec'y.*

VITRIFIED STREET PAVING BRICKS MUST POSSESS TOUGHNESS.

There are some vitrified brick that are so brittle that when the wheels of loaded vehicles come in contact with them they wear off very rapidly. These brick are not good paving. They must combine toughness with the vitrification. If a brick is thoroughly vitrified, it means the whole body of clay melted homogeneously into one mass.

Toughness means the tempering which is given to the clay while in the firing or burning process, whereby the life, grain and tenacity of the brick are not destroyed.

The fact that a brick is vitrified does not of itself make a good paver, as there are a large number of clays which will burn to a state of vitrification and yet make into bricks not suitable for street paving because they lack the necessary toughness.—*Dr. I. S. Hopkins, President Georgia School of Technology.*

Rudyard Kipling's new novel, written in collaboration with Wilcott Balestier for *The Century*, is entitled "The Naulahka, a Tale of West and East." It is a story of America and India. The principal characters live in a "booming" Colorado town, where the story opens, but the scene quickly shifts to the court of an India maharajah, whither the hero and the heroine journey to meet with most varied experiences. The story will begin in the November *Century*.

CORRESPONDENCE.

THESE COLUMNS ARE OPEN TO ALL. THE FULL NAME AND ADDRESS IS REQUIRED BUT WILL NOT BE PUBLISHED EXCEPT WHEN PERMISSION IS GIVEN BY CORRESPONDENT. THOSE DESIRING TO COMMUNICATE PRIVATELY WITH ANY CORRESPONDENT WHOSE FULL NAME IS NOT GIVEN CAN DO SO BY ADDRESSING LETTERS CARE OF CLAY-WORKER.

Gaseous Fuel.

Editor Clay-Worker:

Mr. Waplington in his Convention paper said that thirty to forty per cent. of the fuel might be saved in hundreds of yards, and now calls it quibbling when I pin him down to that statement.

That experiment which I tried "In my ignorance of Natural Philosophy," was suggested by a Professor in that line, whose ignorance brings him in some \$8,000 per Annum, in one of our first class colleges, and who has all his life been engaged in scientific pursuits.

The drawback to the gases escaping from the outer edge of the pyramid lay in the fact that the edges were covered for a considerable distance with sheet iron which covered the whole top of the kiln before we finished burning.

I had always thought, and still think, that a bright flame coming up through the kiln to the top was a partial evidence that enough oxygen had combined with the hydro carbon of the coal, or oil or gas to insure a good combustion. I never went hunting after nitrogen that the oxygen seemed to have no further use for: I presume it went off in a huff along with the "carbonic and steam," only that in the last stage of burning there is no visible steam.

Mr. Waplington would enlighten me by a train of reasoning consisting of A. B. C. chestnuts, and yet with which he says I am familiar. I hope I am not ass enough, not to know that we require a proper amount of air to unite with the hydro carbon of the fuel, and that the absence of smoke is a guide to that.

The thin walls of our kiln do not rob it of any more heat than would be the case if we used his producer gas, and I am not sure that there is any more loss of heat than is absorbed by walls two or three feet in thickness.

Mr. Waplington says we cannot use slack in our furnaces; we do use it; at least as much as comes from the mines without screening, and that is sometimes thirty or forty per cent.

Does any one think that unconsumed gases, as he calls them, passing through a mass of white-hot bricks and so hot when they reach the top of the kiln as sometimes to set the rafters and peak on

fire 14 feet above them have a cooling effect?

Don't all say, Yes; at once.

Now, Mr. Waplington please tell us how you save so much. Don't talk of my failures, but of your successes in burning brick, and how much you save at an equal cost per ton for fuel. I have never alluded to any perfection in our furnaces. What I have written will apply to the Eudaly, or any similar kiln, up or down draft. We burn 8,000 or more brick with one ton of coal. How many do you burn?

The difference in our method seems to be that you manufacture your producer gas at some expense of fuel, and then send it to the kiln through pipes that need constant care to insure uniformity; and we burn *all* our fuel in the furnaces and get as much heat as you do, and consume as much hydrogen and carbonic oxide gas.

You may intensify your heat, but you don't get any more from a ton of coal, and you have to adjust your supply of air as truly as we do. That your method may be more desirable in some uses of coal I do not doubt, but not in burning brick in clamps.

Do you remember Timothy's powder for killing fleas? You catch the flea, take him by the nap of the neck and squeeze him until he opens his mouth, and then drop into it a grain of the powder. There is a royal road to brick burning: Eternal vigilance is the price of success. S. P. CRAFTS.

The Coming Roof.

Editor Clay-Worker:

There is one point in Mr. Elder's letter in July CLAY-WORKER to which I wish to refer before going further. He says, "I would like to know if Mr. Greer read all of our advertisement in the CLAY-WORKER. That advertisement plainly says our form of tile is patented." I shall reply to this question in true Irish fashion by asking another: I would like to know if Mr. Elder read all my letter in CLAY-WORKER. That letter plainly says that I asked for machinery required to try the thing on a small scale, (experiment) drawing attention to the to the cut of this shingle in the CLAY-WORKER as being *something like* what I wanted. Although I had been informed that *no patents on any roofing tile* existed in this country, had my experiments warranted *going into the business*, I would certainly have gone through the form of obtaining permission to manufacture the shingle, whether that permission was required or not. There appears to me to be lurking behind Mr. Elder's question something like an insinuation that I have infringed some of the company's rights. If so it has been unwillingly, and I am quite ready and willing to meet any and every responsibility in the matter. I shall be glad to hear positively on this point.

Mr. Elder "scores heavily" when he says, "*opinion* is one thing, *facts* another,"

and after the evidence quoted in his letter, it would seem foolish to say anything further on these points.

I am very much obliged for the trouble Mr. Elder has taken to describe the shingle, also for his kind invitation to come and see it made, which I will gladly avail myself of on the occasion of my next visit to the States. I am, however, quite familiar with the shingle. The form of my dies is the same as the old shingle, with three ribs in back, and two channels, with a ridge between in front. To this I made, what I consider, an improvement, by widening the ridge so as to narrow the channels at the bottom from the centre, in order to throw the water as much as possible away from the joining between the tiles beneath. I prefer this form of tile to the present shape. I had no difficulty in making the tile. The only trouble I had was in finding buyers for it. This can be largely accounted for by the fact, that the Mexican roofs have all very little pitch, and that this shingle is therefore not suitable. Mr. Elder is quite right when he says "The Mexicans are five hundred years behind the Yankee in many things," but roofing their houses is not one of them. I question very much if at present they are not a little ahead in this respect. There are few housed being built in this portion of Mexico, which are not being covered with expensive roofing tile imported from France. Even "the heavy old form of tile their ancestors used," which made an exceedingly good, durable, and fire-proof roof, are in many instances being removed in favor of the modern roofing tile, where same is obtainable.

I note Mr. Elder's advice "going slow" in trying to make the French tile. I am sorry to inform him that I am going slow—disgustingly slow. One has to go slow in Mexico. It is one of "the customs of the country," concerning which I feel like making "a few *curdory* remarks."

With regard to the French tile, one of Mr. Elder's objections to it is, that it is too large to make by machinery, and burn straight and true. There are several brands of tile imported from France. They are all good, but the most popular here is made by The General Tile Company, Bordeaux. It is made by machinery, as stated on the back. *Societe General des Luileries Mecaniques usine de Bordeaux*, and of the many thousands of tiles which have come directly under my observation, I have never yet seen a crooked one, and very few indeed, even slightly warped. Another of Mr. Elder's objections is its weight. I have had both tiles weighed. The French tile, covering 112 square inches, weighs six pounds, the shingle covering 48 square inches (made the proper thickness so that the two tiles where they overlap will come exactly even,) weighs two pounds, which shows only a matter of a few hundred pounds per M. in favor of the shingle. Against this must be calculated more roofing

timber, double the number of sheathing, laths being required, besides a higher pitch of roof, which, when taken into account, will, I think, leave the balance both as regards weights and cost, in favor of the larger tile.

I might also mention that the same company supplies a *glass roofing tile* of exactly the same shape and size, which is a very convenient method of admitting light to the garret, where it is not desired to incur the expense of a skylight.

I note the machinery which the Company uses in making the shingle, a Penfield and a Raymond repress, which is exactly the combination I intend to employ if my experiments prove satisfactory.

And now before closing I hope you will kindly allow me to say a few words regarding your editorial, "An Important Subject," in same issue of the CLAY-WORKER. In my opinion the question of roofing tile is the most important one which confronts the clay working fraternity to-day. Roofing tile is *the one material* for covering roofs, which embraces nearly every good quality without one serious defect, in fact to employ anything else seems to me "an outrage upon common sense." It is an article which can be made by every brick and drain tile manufacturer in the country, and ought to be as common, and as widely used, as either of those articles. In order to attain the end the thing must be started right. "Be sure you are right then go ahead."

When the international rifle match is to be shot off at Creedon or Wimbledon, are not the very best marksman in the country picked out regardless of all personal motives.—Is not the very best yacht selected to "Whip the Britishers" in the international yacht race. And if there is no craft capable of accomplishing the much desired, but not always easy, task—are not models from all over the world, discussed and compared with most jealous care, and a new vessel built that will, if possible, "fill the bill." And do not the English on their side, take just the same pains to "Whip the Yankee's?" So it must be in the case of roofing tiles. The *very best* form of tile must be selected, and such alterations made, if necessary, as each manufacturer finds is demanded in his locality. The tiles *must* be put upon the market *at a price* which will *at once commend itself*; to which end the manufacturer must be free from all encumbrances. He ought to have no royalties to pay; nor must there be heavy freights added to the cost of the tile. Every manufacturer must supply his own locality—"Casting aside every weight, he must with patience, run the race that is set before him."—(Shakespeare.) With these, or similar, conditions carried out, there is no reason why roofing tile should not immediately, largely take the place of, and ultimately entirely banish from the market, those non-fire-proof, perishable, and inferior materials, like slate, tin,

wooden shingles etc., with which an uninformed, unthinking, or perhaps prejudiced public have been so long covering their houses, and will continue to cover them, until something better is placed easily within their reach. What an immense market too, in this way, can be opened up for the products of the kilns.

When some years ago the British farmer was contemplating of more than usual hard times owing to the low prices in the staple farm products, the result of foreign competition, Mr. Gladstone, that greatest of politicians and wisest and *best of men*, advised them to turn some of their attention to other branches of business, such as growing fruit for making preserves, which were largely shipped from foreign markets; and many of them followed his advice with advantage and success. Might it not be a good idea for some of the "Eastern Brethren," instead of making pale brick to sell at \$2.00 a M., to try their hand at some of the higher and more profitable branches of the business, like roofing tile, enameled brick etc., etc., which the CLAY-WORKER is laboring so faithfully and so well (and certainly at very great expense,) not only to bring to the notice of the craft, but also, to give valuable information and assistance, as to the best way to go about their manufacture. I might also state that in addition to the home market, which, including New York, Philadelphia, Boston and so many rich towns, should be a remarkably good one, there is also the prospect of an export trade—France annually exports very many millions of these roofing tiles to Mexico, and these other Southern Republics.

As regards roofing tile I have read with more than passing interest, Mr. Gibson's able letters on the subject, and note with pleasure that "the matter of tile roofing will be carried down to the work of the present day." If I might take the liberty of making a suggestion, it would be that he describe, as far as possible, the entire process employed in the production of the modern French roofing tile now in use, with the approximate cost, etc., etc. I am not as a rule an enthusiastic admirer of "Mr. Frenchman," but there are many things in which both John Bull and Brother Jonathan must admit that he surpasses them, and this class of work is one of them.

The cost of this French tile, landed here, averages a little over \$45 per M, Mexican money; which at the present high rate of exchange, would be about \$32 American. This includes cost, Ocean freight, insurance, lighterage from the bar, breakage, handling etc., etc., leaving somewhere about \$20 (American) for cost in France. I calculate this tile can be made here at a cost not exceeding \$14 per M; (it sells at from \$70 to \$100,) and I presume in the States for less, although labor costs more there it is much more efficient. So that if to this amount a *fair percentage of profit* be added. The tile could be put upon the market

at a price which would, I think, place it immediately as a material for roofing, in the same position that brick occupies for building. And this is its proper place.

I fear what I have written may make me appear as an enemy of the Clay Shingle Co., and their product. This is a position I altogether decline to accept. I have the kindest feelings and best wishes for their success. The "Donaldson Shingle" I consider a most complete and beautiful tile, and for turrets and towers, or steep gothic roofs, where there is little or no necessity for passing over the roof, and for which the nail fastening is the most suitable, I think that this shingle is *perfect*, and will always command a large and increasing share of patronage; but, for the clay-workers of the country to select it as their *champion tile*, to drive all competitors from the field, would, to me, appear "Like sending a boy on a man's errand." It would, I consider, be a fatal mistake, to prevent which I have taken upon myself the unpleasant task of writing as I have done. It is

*"Not that I loved Caesar less
But that I loved Rome more."*

In conclusion I regret that what I wrote should have incurred even the slight disapprobation with which you mention it. I did not write "unadvisedly" and "more careful investigation" forces me to conclude that *the coming roof* will be a *large tile*, strong enough for men without shoes to walk all over without picking their steps, (with ladders on their shoulders, if necessary, instead of under their feet), to repair the roof, chimneys, gutters, skylights, or what ever else may need attention. (This can be done with the imported French tile). A tile which can be easily put on, and which *can be taken off* the roof, and which will not be protected by patents issued under the broad seal of the United States. ROBERT M. GREER.

Tuxpam, Mexico.

Machinery at Conventions.

Editor Clay-Worker:

Two brickmakers have addressed the craft through the columns of the CLAY-WORKER on this question, and, strange to say, have taken opposite sides. Bro. McCain advocates throwing the doors WIDE OPEN to the machine men and their machines, believing that whatever contention may be caused by the innovation will result in good to the craft by the "survival of the fittest" in clay-working machinery. There is nothing of the "Keep off the Grass" spirit about Brother McCain.

Brother Purington leads the opposition, maintaining that the strife between the machine men, each one trying to defame the others machines and the brickmakers telling what they know about brick machines would destroy the peace of the convention. Ahem!

No doubt the exhibit of the wonderful machinery in operation, illustrated

in the CLAY-WORKER, would be the most instructive thing that could be presented to the convention. But the writer is not aware that there is even a desire on the part of the manufacturers to make such an exhibit, and certainly it would not be attempted without a very liberal spirit being shown by the convention. Let the members look over your columns, count the machines, estimate the space required to operate them, and the power to operate them successfully, with all machines for the preparation of the clay, and they will gain some idea of the greatness of such an undertaking. The expense to each of the principal manufacturers would be more than the expenses of the convention. The manufacturers have not exhibited at Fairs for several years, and it is quite improbable that they would exhibit at conventions, even if they were invited to do so. It would be impossible in many places to secure hall and power suitable, in the winter, for such an exhibit. The convention would have to to abandon its Nomadic character and take a local habitation in some Central city. We have formed bonds of friendship extending over the United States and Canada, and reaching out into Mexico. Could this have been done to so great a degree had we been confined to Indianapolis? I think not. (We cannot deny ourselves the pleasure of accepting Brother McCain's invitation to "Come to Denver when the World's Fair shall be held there.")

It would greatly increase the time of holding the convention. A week would be little enough, without devoting any time to brickmakers, "to tell what they know about certain machines," or to machine men to tell what they know about certain brickmakers.

Special days for the inspection of the machinery would have to be set apart and the convention adjourn for that purpose, or there would be no convention, for the members would be attracted to the exhibits, and trust to reading the proceedings in the trade journals. Why discuss the subject further?

The manufacturers are too conscious of their importance to the craft, of the part they play in its advancement, and of the progressive and liberal spirit of the N. B. M. A. to fear any spirit of exclusiveness that may from time to time arise. Our "ads." support the trade journals and thus make conventions possible. A man's head must "taper the wrong way" who can take any other view. But we cheerfully recognize our dependence upon the craft. Our interests demand that we should work together in conventions.

If we talk too much we will cheerfully take a back seat. If we are too officious in introducing our business in the halls and anterooms, please have your committee secure a hall for such purposes, which is only to be opened at certain hours, or evenings when the convention is not in session. We must attend to business, but do not wish to interfere in any way

with the business of the convention. A little forethought on the part of the management will prevent any disturbance. "Let there be no strife between us for we are brethren."

GEO. S. TIFFANY.

Balky Kilns.

Editor Clay-Worker:

I was much amused with Mr. T. Moulding's letter, in your issue of July 15th, on the subject of "Balky Kilns," and I must ask you to allow me to make a few comments thereon. Though I do not profess to "know it all" I do believe that my experience of forty years qualifies me to give a little advice on most subjects connected with practical brick-making and burning. Mr. Moulding's idea is so old-fashioned that I did not think (except, perhaps, by ancient tradition,) the present generation was acquainted with the method he advocates. I recollect, some years ago, an old gentleman of seventy whose grandfather was a brickmaker, asked me whether we ever fired muskets in the arches to clear out the soot, and he was greatly astonished when I told him I had never either heard of such a thing being done or seen the necessity of it.

If the brick are of proper proportion, and properly set, a balky kiln is an unknown quantity in the present day, that is, if the burner knows his business. I remember when I was a boy, what important persons brick burners were—how many fads and fancies they advocated—what ingenuity they showed in inventing reasons to account for cold spots in the kilns they burned and sometimes failed to burn, and I long since made up my mind, that they did not know the first rudiments of making or burning, but founded their so-called knowledge on other people's ignorance. They did not know then where to begin and that is where we have the advantage of them to-day,—they did not begin at the beginning.

It is of the utmost importance that the brick should be *made* right, and burning therefore actually commences at the machine. The proper proportions of clay and sand (and coal if used) must be put into the brick, the mud tempered thoroughly, and pressed into molds that are of the right size. The latter point is important, as, if it be neglected, the brick will not set right, and consequently will close up the draught. I know of no stronger proof of this than can be found by setting pallet brick in the same way as the open yard brick. The latter are handled so many times that the corners and edges get chipped off, and not pressed so hard and are consequently more porous, and I believe that it has been the experience of every brickmaker, that when the pallet system has been substituted for the open yard, the pallet brick being more perfect and shapely, and being set in the same way (that is as tight) as those made on the open

yard, there has been found considerable difficulty in getting the fires through.

But there are other ways of stopping the draught, and all of them are caused by ignorance, whether it be of the maker, setter, or burner. For instance, it is possible to set the brick so tight that there is no draught, in which case nothing can be done. And it is possible to fire too strong. When the kiln is full of fire give it another good dose and it will balk for a while. But an experienced man would know better than to do this.

There are certain rules for a brick manufacturer to follow which are essential if he is determined to burn good, hard brick. The burner should be the maker, if possible, (but this is not imperative,) so that he can have an intimate knowledge of the manner in which the brick have been made and set. He must be a man of experience, and when his work is satisfactorily performed his services should be retained, as he is a scarce article. Then he must have an assistant during the burning on whom he can rely, not necessarily an experienced or highly paid man, but one who will do just what he is told to do, neither more or less. My yard is run on this system, and my customers tell me I furnish the best pallet brick made in the State of Connecticut, so I have every reason to stand by my opinions.

To sum the matter up: The whole secret of success lies in having an experienced and thoroughly competent foreman. Then you will have no balky kilns.

In conclusion, I hope Mr. Moulding will not feel that I have stepped beyond the bounds of just criticism, as my object is to help my brother manufacturers with the benefit of my experience, so far as I can possibly do so,

Berlin, Conn. MARCUS E. JACOBS.

Continuous Brick Kilns.

Editor Clay-Worker:

I have read and heard a little of continuous kilns for brick burning, but never had the opportunity of seeing one until a few days ago, and this I was given to understand was a genuine Hoffmann kiln, and said to be the best kiln on the market to-day, its chief characteristic being economy of fuel, and its only drawback, its first cost; it burns bricks very satisfactorily with half the fuel that is used in ordinary kilns. The coal used must be carefully and judiciously selected, however, and coals that clinker must be avoided, using such only as burn to a light colored ash without clinkers, to get the best results. This kiln, I was informed, was built 22 years ago and cost \$25,000; its foundations consist of 1,000 perches of rough stone work, and in the kiln proper there were laid 180,000 fire bricks, these being flanked up by 360,000 red bricks. The interior of the kiln is simply a tunnel in shape of the link of a chain. The firing is effected from the top by dropping the coals down an opening left for that purpose, in fact

these openings are left at intervals all round the kiln and the coal drops into a receptacle left in the green bricks by the setter for this purpose, viz., for a fire plan, on the opposite side of the tunnel is another opening for the smoke, steam, and products of combustion to escape into a flue leading to the chimney; this opening, or outlet, is only one of several, for they too are arranged all round the tunnel, same as the firing holes and opposite to them, the firing holes being on the outer side of the tunnel, and, the outlet holes being on the inner side, the kiln is therefore a horizontal draft kiln; the chimney is on the center of this immense link shaped mound and is 9 feet inside diameter at the bottom, and 100 feet high—it is tapered and I judge not less than 5 feet inside diameter at top.

The kiln has 16 openings for charging and discharging the bricks 6 openings down each side and 2 inches each end. They charge and draw about 6,000 fire bricks per day; two men do the charging and setting while one does the discharging, or wheeling out.

The capacity of the kiln when full is 100,000 fire bricks.

In the ordinary round kilns—some up-draft and some down-draft—they use about 15 tons of coal to burn 32,000 bricks, or 2,133 bricks to the ton of coal consumed, and based on the statement given above the Hoffmann burns 4,266 brick per ton of coal.

As far as I was able to judge, the burning was even and good, and I must admit that while I was being shown and informed what is here stated, I was very favorably impressed with the Hoffmann kiln, but after a little quiet thinking over, my enthusiasm gradually subsided, especially when I examined the other side, for it presented itself in this shape. The kiln will burn in the course of a year—allowing 6,000 for every day in the year except Sundays—1,878,000 bricks. A very small output for such a large outlay. The coal for such a year's work would be 440 tons say at \$4 equals \$1,760 and the interest on \$25,000 at 7 per cent. equals \$1,750, which would show a saving of \$10 in the course of a year. If there are any other advantages connected with the kiln they were not set forth, and, with my limited information on the subject, my conclusions are in nowise favorable to the continuous kilns of the Hoffmann type, and I am led to inquire: "Is such a mass of masonry really necessary for a good continuous kiln? Is it also necessary for a chimney of such dimensions? If so, the gain in fuel is swallowed up in the first cost, and unless there are other compensating points unknown to the writer he can see no advantage in their use.

The cost of a Hoffmann—if I am correctly informed—also represents the cost of a good Dunnachie plant of 140,000 capacity. These high priced small capacity kilns both take up a great deal of foot space, and, to sum the matter up, I must confess that my first impressions

are by no means permanent about continuous kilns. If any of your able readers feel inclined to show up the Hoffmann, Dunnachie, or any other continuous kiln in a more favorable light, I, for one, will thank them to do so. BONHOMIE.

P. S. This was written several days before the appearance of Mr. Hammer's letter in the last issue of the CLAY-WORKER. B.

Philadelphia News.

Editor Clay-Worker:

The unexpected has occurred in brickmaking business. When the extreme lull in building manifested itself early in the Spring and continued throughout the Summer, it was the general opinion that trade would remain dull well into the Fall months, consequently most of the brick yards shut down, and manufacturers concluded to await events. Within the past week a large number of plans have been taken from the architects boards which show costly and large dwellings, public buildings and factories. In consequence of all this, all the lower section brick yards have started up in full force. The extreme northern yards are not so busy as yet, they being farther from the business centre.

In fact brick industries of the city are reviving very fast and most of the yards have already gotten rid of their surplus stock, and are preparing to stock up for future wants. It is currently reported that prices have already advanced from twenty-five cents to a dollar on a thousand. The ruinous prices that have been maintained all this season are being broken. The question of labor, has been harmoniously settled, the men generally receiving twenty-five cents below the scale of wages adopted at the commencement of the season. On account of the flat state of affairs there was no demur made by the men, except in one instance, where one firm made a reduction of fifty cents; the men struck and a compromise was effected.

During the month of August it was calculated that the output exceeded 50,000,000 brick from sixty yards. This encouraging outlook was brought about by the number of large contracts that had been recently awarded.

The Jarden Brick Company has been, and continue to be very busy; they are operating two machines for common brick, and are turning out 60,000 brick a day. They are also busy in fancy and press brick; they have sold a large number and have orders on hand for 15,000-000.

It is estimated that the two stables of the Traction Company at Twentieth and Wharton Streets, and 16th and Snyder Avenue, will take 4,000,000 brick. The Bentz building to be fifteen stories high, 3,000,000, and the Fox apartment house, 1,500,000.

The Peerless Brick Company are also busy on moulded, ornamental and fancy brick for interior finish.

Since the commencement of erecting the public buildings, 74,633,326 brick have been hidden away behind the massive walls. Last year over 350,000 were used, and it is said as many more will be eaten up the coming year. The following yards have contributed to this vast amount of brick: Excelsior, Dobbins, Hume and Kerns. John Hancock, an old and experienced bricklayer has the management of the brick work for the buildings.

Among the individual extensive brick-makers in this city there are none to surpass, if to equal that of Robert Paschall, who controls three brick yards, and has made 125,000,000 brick since commencing business in 1882. Mr. Paschall is a descendant of one of the oldest families of West Philadelphia. In the year 1600 his maternal ancestor came to this country with a grant from King Charles for a large tract of ground on the banks of the Schuylkill, in the district known as Paschallville, near the Delaware County line, where Robert was born. He served his country faithfully in the army, entering as a private of Company E. 118 P. V., and for gallant conduct was promoted to captaincy. He is also a prominent factor in politics, and is consulted by the leaders of the Republican party on all questions effecting their interests.

Vast quantities of West Virginia vitrified brick are continually arriving, and many of our suburban streets are being beautified by them. Wherever they are used the people are well satisfied with them; they are considered much better than the asphaltum or cobble stone, because while they show an even surface, they also allow a firm foothold for the horse.

The Trinidad Asphaltum Block Company are also busy laying their street tiles; they are considered cheaper than good cement, and more durable. One advantage they possess over cement flooring is that they may be taken out and relaid like brick. They present a very even showy appearance, and are particularly suitable for breweries, stables, etc. ANON.

Fuel Gas.

Editor Clay-Worker:

Referring to the interesting correspondence between Mr. Thad. S. Smith and T. H. Brooks & Co., Cleveland, per H. B. Hubbard, Pittsburgh.

While cheerfully subscribing to the reply of Mr. Hubbard as a whole, I must take exception to one short sentence, viz.: "For fire brick a suitable degree of heat cannot be reached without hot air to burn the gas." To this I can only say that my experience has taught me that such a degree of heat can be raised with cold air to burn the gas. I have told your readers before of the fire bricks that were burnt and well burnt too—at the Peoria Pottery in 1886 to 1888—see the Convention number of the CLAY-WORKER, or, the Fifth Annual Report of the N. B. M. A.

I think Mr. Hubbard will, on further consideration of the subject, see no reason why the gas burnt with cold air should not produce as high a temperature as coal burnt on a grate with cold air, independent of any established facts. WM. WAPLINGTON.

Machinery Exhibits, Etc., at Conventions

Editor Clay-Worker:

I have read with interest the articles that have appeared in recent numbers of the CLAY-WORKER about machinery exhibits, and whether or not, men who are interested in the manufacture and sale of brickmaking appliances should be admitted as members of the National Brick Manufacturers' Association, and, being a "kiln" man, have kept still, as we always do. The articles referred to above are all good, in my opinion. I indorse the article of my esteemed friend from Philadelphia, who manufactures one of the most popular brick machines now in use. There is one sentiment in it, however, that I wish to expand somewhat. I will quote from his article: "We do not think that machine men and kiln men should be placed in the same category." I have had many doubts as to what disposition would be made of us, should the Association decide to separate us from the pure unadulterated "bricks," but from the above I conclude we are to be confined in the category.

The kiln men as suggested should be placed in a special category. It is well known that Bro. Pike, of Illinois, and Bro. Eudaly, of Ohio, occupied a solitary bed at the same time, *harmoniously*. Now I imagine a category is more spacious, and vastly more elegant, than a common hotel bed. My friend from the City of Brotherly Love further says, that the machine men have been particularly careful not to occupy the time of the Convention with their particular interests. I believe the minutes of the conventions will show that the kiln men have not occupied the time of the Convention with *their* particular interests. The writer did read a paper before the first Convention at Cincinnati, on "Brick-making in the South." I think, however, the committee on programme should be pardoned for this, their first, and only offense, as the Association had not yet got into the woods, and, timber being scarce, they had to use what they could get, if it was a little brash.

Twenty years ago brickmakers looked upon inventors of machines, dryers, or kilns, with suspicion, and considered them a foe to their best interests of the brick manufacturer. Not so, now. That day is past and gone, never to return. There will be no war between these interests, for the reason that there is no cause for it, so far as I have been able to observe. The utmost harmony and good feeling has prevailed between them at our meetings. It might be better if there were no exhibits of any kind in the immediate vicinity of the Conven-

tion Hall, as they do interfere somewhat while the Convention is in session.

Would the exclusion of machine, kiln or dryer men, prevent their having exhibits in the vicinity? Hardly; and, not being members, they would feel less interest in the sessions. If memory serves me aright, most of the exhibits at Indianapolis, in the rooms near the Convention Hall, were brick manufacturers' products, such as paving bricks and paving blocks of all kinds, repressed, ornamental and enameled bricks.

I mention these matters, for the reason, that there was some complaint at Indianapolis, of this nature. One prominent member, and officer of the Association, said he would offer a resolution at the next meeting, that these exhibits be put under lock and key during the sessions of the Convention. This would not be practicable, as such a resolution would be non-effective. After studying the matter over carefully, I agree with friend D. V. Purington, that we had best let well enough alone. Our conventions are inspiring, harmonious, and profitable to the members, and its proceedings are read with interest and profit, by thousands of brickmakers who cannot attend. I go to the Convention as a brickmaker. I take part as a brickmaker.

R. B. MORRISON,
Gen'l Sup't Rome Brick Works.
Rome, Ga.

New York News.

Editor Clay-Worker:

The chubby-faced, golden-haired little girls, that frolic about our door-steps, have a new ditty now. You remember the old one. It went something like this:

London Bridge is falling down, falling down, falling down,
London Bridge is falling down,
My fair lady!

Now, instead of London Bridge, they are substituting New York City in the song, and they are not so very far out of the way. The awful disaster of the 22d ult., when over three-score men, women and children, were killed by the falling of a building, is one that has revealed in all its most horrible features the frailty of a large number of our down town business structures, and has sent a shock through the entire community. One of the architects called to testify at the inquest, gave it as his opinion, that the load of paper and printing presses the floors were called upon to bear, were too great for them, and in doing so, he voiced the sentiment of everybody cognizant of the facts in the case.

The truth is, that many of our business structures were not constructed for business. Neither good lime, good mortar, nor good bricks, have been used in a number of cases, and the probability is that the lesson of the awful disaster will be taken strongly to heart and a thorough investigation be made all over the city.

The brick market is in a most sluggish condition, in spite of the fact that they are moving in large quantities. A weaker feeling is manifest and prices are decidedly low. Haverstraws are selling at from \$5 to \$5.50, pale brick at \$2, Up-Rivers at \$4 to \$5, and Jerseys at \$4 to \$4.25, with no prospects for a rise.

With characteristic stubbornness the yards are still keeping open, but the moment that one or two take the initiative they will all shut down and be glad of the chance, for the output is only flooding the market and keeping the prices down. Considerable building is still going on, though dealers think there would have been much more had it not been for the strike of the iron and timber men early in the year.

Among the new structures contemplated for erection, shortly, will be a 26-story office building, opposite Bowling Green, to be built of iron and steel.

A. L. Jimmerson & Son, brickmakers, of Fresh Pond, L. I., have made an assignment to George R. Ackerly, of Brooklyn.
BRIC-A-BRAC.

THE WORLD'S FAIR.

AN OPEN LETTER

To Manufacturers and Inventors of
Clayworking Machinery, Dryers,
Kilns, Etc.

The undersigned have been appointed a committee by the National Brick Manufacturers' Association of the United States to secure an International exhibition of clayworking machinery at the World's Columbian Exposition to be held in Chicago, in 1893. The committee, after carefully surveying the ground and scope of the enterprise, would suggest that united action on the part of exhibitors is necessary in order to secure the best results in the proper arrangement of the display, and a more liberal allotment of space and privileges.

It is the desire of the committee to have every manufacturer of clayworking machinery and appliances in the United States represented in the exhibition. They, also, desire to have a display cred-

itable to all concerned, and one that will reflect honor on the craft in general. The committee has been in conference with the officials of the Columbian Exposition, and the latter advised us to "Correspond with the machine men and find out how many will exhibit and how much room they will need, and then the committee apply to them for space," and add; "The sooner you apply for space the better."

In view of the above facts we issue this circular and request an early response from every manufacturer of machinery, and prospective exhibitor, viz:

1st. If they are favorable to the scheme.

2nd. If so, the nature of the exhibit they contemplate, and how much space they will need.

The committee must be in possession of the above data at an early date, in order to go before the Exposition Board and apply for sufficient space for all. We would further state that there will be no charge for space in the Exposition; exhibitors to pay the freight on goods to and from the Exposition.

In conclusion, the committee would say, that having been appointed by the National Association to superintend this display, we are actuated by a sense of duty to do our part in the matter and treat all fairly, and make this part of the Exposition worthy of our great calling. To do this will take the united action of all concerned and the hearty co-operation of all interested. Committee would recommend early action and an early response to the questions embodied in this circular. Address C. W. Raymond, Sec'y Committee, Dayton, Ohio:

Committee.	B. W. BLAIR, <i>Ch'mn</i> ,
	Cincinnati, Ohio.
	C. W. RAYMOND, <i>Sec'y.</i> ,
	Dayton, Ohio.
	ALBERT GLEASON,
	Washington.
	THAD. S. SMITH,
	St. Louis, Mo.
	C. D. B. HOWELL,
	Chicago, Ill.

The Central Press Brick Co., Cleveland, Ohio, are out with a 50-page catalogue of Plain Moulded and Ornamental Pressed Brick manufactured by them, which should find a place in the office of every architect and builder. The brick made by this company are all that the catalogue pictures them to be. Those of our readers who may want a fine grade of ornamental brick should obtain a copy of this little book and specimen bricks.

THE CLAY-WORKER.

PUBLISHED MONTHLY.

Indianapolis, Sep., 15, 1891.

Entered at the Post-Office at Indianapolis, Indiana
as second-class matter.

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One copy, one year (in advance)	- -	\$2.00
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Six copies	- - - - -	10.00
Ten copies	- - - - -	15.00
Foreign subscriptions Fifty Cents additional.		

Subscribers when ordering a change of address
should give both the old and the new address.

ADVERTISING RATES furnished upon application.

Correspondence on all subjects of interest to Clay
Workers is solicited. Communications from practical
men will always be welcome. Address all
communications to

T. A. RANDALL & CO.,

81 Massachusetts Ave. Indianapolis.

FIREPROOF FIREPROOFING.

The comparative value of slow burning construction and modern fire proofing is well illustrated in the current issue of the *Inland Architect* in its account of the burning of the lumber exchange building, in Minneapolis. The walls of the structure were of brick and the interior constructed of wooden joists supported by iron columns and girders. Both wood and iron were covered with fire proof tile, the entire system being what is known as slow-burning construction, but not fireproof. It was decided to enlarge the building and the architects designed a fireproof building of longer frontage and eleven stories high, to join the old building on the east. Back of this building is the Electric building, ten stories high and fireproof. Facing on fifth street, south of the old exchange building is a stone and brick building of ordinary wood construction, five stories high, a twelve foot alley between. This was occupied as a paint and oil store. When the new lumber and exchange building was built two stories were added to the old building and fireproofed. Thus without design a perfect foundation for a magnificent and exhaustive test was laid, and needed only the conditions that existed at the time of the fire to carry out the test in every detail. Here was a wooden building five stories high for the fire to gain headway in, filled with paints and oils. The new building almost completed,

with a 35 foot opening at each floor, through which the fire had perfect communication, was subject for an entire day to a terrible heat.

The fire gained considerable headway before being discovered, and the paint store was a mass of flames before the firemen arrived. When the old exchange building caught fire, the flames were fought from the outside, and the burning continued for twenty-four hours, leaving the interior with only the iron beams remaining. These still retained their fireproofing and supported the new addition of the tenth and eleventh stories, and which was thoroughly fire-proofed, and stood the great heat generated by the nine lower stories without a flaw or crack. A hole about four feet square was cut through the tenth floor after several hours of labor by the firemen in order to reach the fire below, and even here the remainder of the arch was not destroyed. These arches were seven feet between beams and consisted of five-inch hollow tile. While the value of slow-burning construction, *i. e.*, wooden joists covered with terra cotta tile, is not fully demonstrated in this fire, the covering having been to a greater or less extent knocked off by falling timbers, it is sufficient to show how inadequate this system is beside the regulation fireproof system in which iron or steel joists are used.

A SHORT SIGHTED POLICY.

Members of the Plasterers' Union in Philadelphia refuse to work with the boy graduates of the Philadelphia builders' training school. The incident is one of the many where the trades unions have gone beyond their legitimate field by a shortsighted policy of preventing American youth from learning and practising a useful trade. The trades unions, generally, are growing arrogant and despotic. Ostensibly formed for the prevention of despotism by "capital," most of them are more despotic than the most tyrannical of the employers, without any of the latter's conservatism. The policy of the the plasterers of Philadelphia is shortsighted, because it strikes at the root of what, ultimately, would be the strongest rampart against cheap wages by producing intelligent and highly trained skill, which, ultimately, would strengthen the unions themselves.

Our American trades unions are af-

flicted with large moieties of half trained labor, which the unions decree shall receive the same uniform price as the best trained professional. It is not only grossly unjust to the employer, but equally unjust to the best workmen, and the tendency is to lower the status of the whole trade to the level of inefficiency of the poorest. The final result of such a policy must react disastrously upon the unions themselves.

BRICK VERSUS STONE.

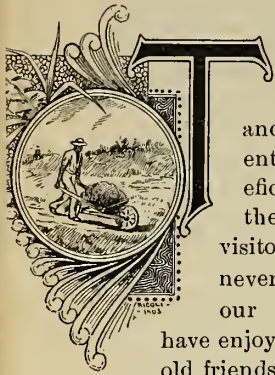
A notable instance of the lasting qualities of paving brick is found in a piece of pavement laid by Mr. Napoleon Haefer in Bloomington Ill., in 1879. A portion of the same square was paved with stone at the same time and is now being torn up, having become worn out, to be replaced with brick, while the old brick pavement is still in good condition and bids fair to last many years longer. Mr. Haefer is a pioneer in the paving brick industry, being one of the first to make and lay paving brick in this country. As early as 1871 Mr. Haefer took up this mission and sought permission from the Bloomington authorities to lay a block of brick pavement at his own expense in order to demonstrate its value, but the prejudice was so great that he did not succeed till three years later (1874) when he was permitted to make the experiment which was entirely satisfactory; the pavement then laid being still in use and in good condition.

A WORD TO MACHINE MANUFACTURERS.

The Committee on an International exhibition of Clay-Working Machinery in connection with the Worlds Fair have a communication on another page of this issue that should receive considerate attention from every manufacturer of machinery who contemplates taking part in the Exhibition.

The desire and purpose of the committee is to further the interests of the manufacturers by securing a more liberal allotment of space and favorable conditions; thus insuring a larger and more creditable exhibition. Past experiences should teach the manufacturers the importance of concerted action, and this can best be attained by their replying promptly to the committee's queries.

BRICKYARD SKETCHES.



THE frequent and many rainstorms that prevailed during the latter part of July and the first of the present month, however beneficial to the crops, made the path of the brickyard visitor a slippery, sticky one, nevertheless we persisted in our monthly rounds and have enjoyed the cheer of several old friends and some new ones in the pursuit of brickyard lore.

AT GRAND RAPIDS, MICH.,

We visited the works of Brown, Clark & Co., one of the oldest plants in that section and found them turning out common brick at the rate of 60,000 a day, using one sword machine made by H. Brewer & Co., Tecumseh, Mich., and two Kells stiff clay machines. The clay is hauled in in carts and dumped into an Emens granulator, and thence to the machine. The brick from the stiff clay machines are cut by hand, placed on spring trucks and carted to the yard, where they are piled nine high and left to dry. They are burned in common clamp-kilns with wood which costs about \$2.50 to \$3.00 a cord. On an average it requires eight days to burn, consuming thirty-two cords of wood for every one hundred thousand brick, which are white or cream colored. They do not sell the brick at a certain price per thousand, actual delivery, as is commonly done, but at \$4.50 per thousand wall measurement. Where brick are sold at the yard in small quantities the price ranges from \$6.00 to \$7.00 a thousand for common, and \$12.50 for repress. The grounds occupied by this plant is now too valuable to justify the continuance of the yard, so that at the close of the present season it will be abandoned and new works started a few miles further out, where the company have a large tract of clay land.

OPEN TO CONVICTION.

Mr. Clark is investigating artificial dryers, but is quite skeptical as to the economy of that system, compared with the old outdoor sunshine method. This firm also makes a small amount of drain tile—two to six inches—using the Tiffany tile mill, and burn with the brick, setting the tile six courses high in the upper part of the kiln, finishing with two courses of brick laid flat and tight. Their tile trade is increasing some.

TWO NEIGHBORING YARDS

Are located a short distance beyond, and are making the same character of brick, in the same manner, except that their clay being a little stony, clay crushers and stone separators are used. Here we found a Hoosier product—a Potts Disintegrator—doing excellent service.

We next visited the works of the Grand Rapids Brick Co., in company with Mr. W. A. Hughart, president G. R. & I. R. R., to whom we are indebted for much kindly attention. Mr. Hughart is interested in the plant but indirectly, his son, Oliver O. P. Hughart, being one of the principal stockholders and managers. The plant is a new one, very conveniently arranged and well equipped with machinery, dryers and kilns. They are now burning with coal, but intend to use oil, and are now investigating burners, etc. They have one Brewer-Sword and a Little Wonder stiff clay machine, with automatic cutting table, and a Boyd dry press, with all of which they are well pleased.

A NEW WAY OF HANDLING AND DRYING.

The brick as they come from the machine are piled four or five high on boards four feet eight inches long, eight inches wide and one and three-quarter inches thick. The ends of the boards rest on stringers, and, as they are loaded with brick, are shoved forward on the stringers or away from the machine by the offbearer. The stringers are high enough to permit a car or truck to be run beneath the boards. By a lever on the car a half dozen or more of the



loaded boards are lifted and wheeled away to the dryer. This, we were told, is done easily and quickly, one man and car being sufficient to move the brick from machine to dryer. The brick are taken from dryer to kiln in the same manner, one man and car doing it easily. The dryer is constructed very much like the ordinary steam tunnel.

It is a frame structure 160 feet long, divided into four tunnels, each containing three tracks running between rows of stringers, extending the entire length of the tunnels. Between and beneath the tracks steam pipes are laid and heated by exhaust steam. The temperature is the same throughout the tunnel, and the moisture is allowed to escape through openings in the roof, there being no stacks, chimneys or fans. They burn in Eudaly square down-draft kilns, and will probably make paving as well as common and pressed brick. The works were not in operation at the time



of our visit, owing to the death and burial of the foreman.

AN OLD ESTABLISHMENT.

On the following day, between showers, we visited the works of Veneklasen's Sons, at Zeeland, Mich., one of the most venerable brickmaking concerns in the State. It was established in 1848 by H. J. Veneklasen, and, having passed from one generation to another, has been in operation ever since. The proprietors have been progressive men, and the plant is now quite modern in appearance and equipment. In 1848 the annual capacity was 50,000. Now it is making 64,000 a day, the yearly output being about ten million. They have a fine bank of clay, both as to quantity and quality, having gone down to the depth of fifty feet and will go still deeper. There is a top layer of sand and gravel from three to eight feet in depth, which in former years was a source of trouble and expense, but which they now utilize. By screening it they separate the gravel, for which they find a market, while the sand is mixed with their clay advantageously. The clay is shoveled into dump cars by hand (they are thinking of putting in a steam shovel), hauled by horse power to the foot of an incline, where a wire cable is attached, and it is then drawn by a steam

hoist to a platform, beneath which is an Emens clay granulator and feeder, which thoroughly mixes the clay and sand and feeds it into two Kells stiff-clay end-cut machines. From these, being cut by hand, the brick are piled on double-deck iron cars and taken to a tunnel dryer, erected by the Chicago Iron Clad Dryer Co. Mr. Veneklasen is very much pleased with the dryer, and says it is a perfect success. The advantages of this system of artificial drying compared with the old "sunshine" way was well exemplified at the time of our visit, for notwithstanding the heavy though intermittent rain storms, the stream of brick flowed on uninterruptedly. Nothing scarcely could induce Mr. Veneklasen to go back to the old "make brick when the sun shines" method. They burn in common square kilns, and make a handsome white brick. They also

track are eight soak pits, two being emptied by each machine every day. J. A. Koehler's was the next yard visited. Mr. K. has taken

THE SECOND STEP,

And is running a steam-power soft-clay machine, making about 25,000 a day, dries by the rack and pallet system, and burns in round down-draft kilns. Mr. Koehler is laboring under the disadvantage of a very shallow clay bank that is mostly soil and well besprinkled with stones and roots. To rid it of these he uses a stone separator and crusher, which laminates the clay badly, in fact the clay goes to the machine in great flakes or scales about the color of an old rubber boot, and seemingly about the same texture. It seemed to us that such a mass would be exceedingly difficult to temper, yet it was done, for the brick, as dumped on pallets placed on a revolv-

an exact counterpart of the original machine, but in the main it represents the Chambers Machine as first used by you in Chicago. We hope you will accept the model and derive some pleasure from its possession. Yours Respectfully,

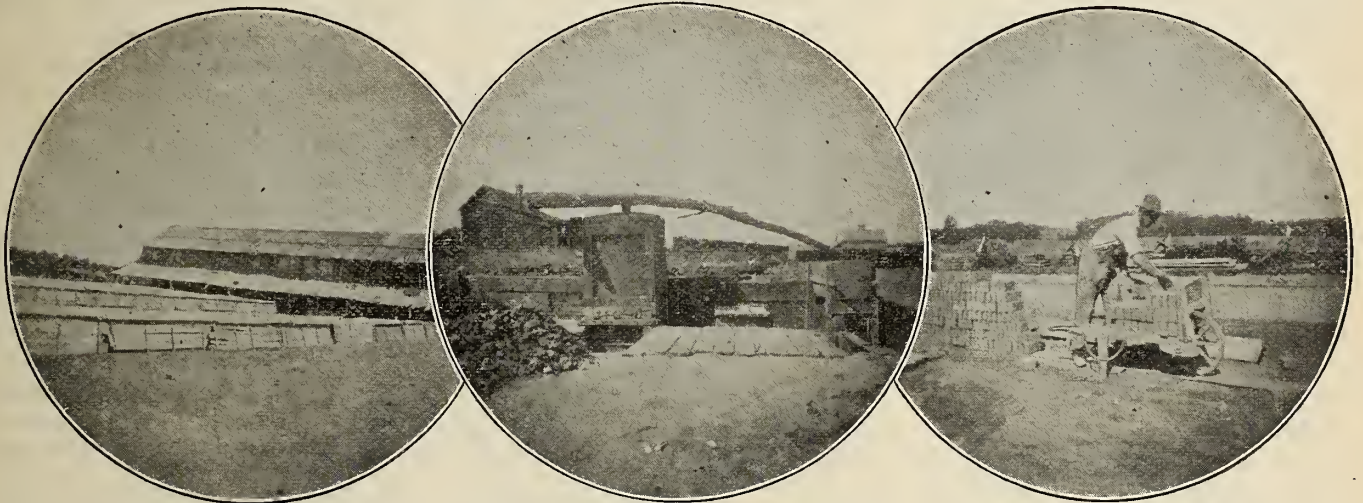
CHAMBERS BROS. COMPANY,

J. H. CHAMBERS, Gen'l. Manager.

The model is twenty-four inches long eight inches wide and ten inches high and is enclosed in a glass case. The machine is nickel plated and is altogether an elegant office ornament, which Mr. Purington prizes very highly because of the associations and memories it calls up. No gift, he said, could give him more pleasure.

TRADE PUBLICATIONS.

The Chicago Clay Journal is the title of a new neatly printed monthly magazine, published by F. P. Meyenberg 155 Washington St., Chicago. As the name implies, it is devoted to the



have a yard at Hamilton, Mich., where they make red brick.

AT FORT WAYNE, IND.

We visited several small yards, where we found they had taken the first step in progressive brickmaking—from hand molding to horse-power yard. The largest yard is that of Wm. Moelering & Co. They run two-horse-power machines, dry by the rack and pallet system, and burn with coal in old-style kilns with permanent walls. The arrangement of the yard is very convenient for them, their delivery being entirely by wagon. The kilns occupy the center of the plat, while on each side of these is the dry sheds and beyond these the machines, which are placed on tracks running the full length of the yard. Between the rails of these tracks is a trench, which is kept filled with water for use about the machine. Ranged along the outer side of each

ing pallet table, a very convenient device made by the Tiffin (O.) Agricultural Works, looked very nice.

A PLEASANT REMINDER.

Our genial friend D. V. Purington of Chicago recently received a most appropriate gift from the Chambers Bros. Co. of Philadelphia; a model of the first brick machine put up in Chicago by Mr. Purington. It was accompanied by the following letter which we were permitted to copy:

PHILADELPHIA, August 31, 1891.

MR. D. V. PURINGTON,
CHAMBER OF COMMERCE BUILDING, CHICAGO.

DEAR FRIEND:—As an object in which we thought you would be interested, and as some slight expression of our respect and esteem after ten years business relations, which have been conducted with a mutual consideration that has avoided any differences, we have had finished up and to-day send you by express a model representing, so far as is practicable, the first Chambers Brick Machine started by you in Chicago. In some little details you will notice that the model is not

various clayworking industries. It contains some very readable matter and some that might well have gone into the waste-basket. Barring the matter of a personal character it is a very creditable production quite worthy of the name it bears. Subscription price \$2.00 a year.

E. M. Freese & Co., Plymouth, Ohio, have favored us with a very handsome little book, entitled "Sample Bricks." From the embossed cover, to the closing page, it is filled with interesting matter beautifully executed. The sample bricks are, as usual, free from flaw or blemish, every one a perfect brick. Send for one.

The Clay Shingle Co., Indianapolis, Ind., have ready for distribution a neat little circular illustrated and setting forth the advantages of their FIRE CLAY ROOFING TILE. A copy will be mailed to any of our readers on application.

EDITORIAL NOTES and CLIPPINGS.

Red Oak, Ia., is to have a brick yard.

Cyrus Flagg is making brick at Topsham, Me.

Rankin & Lewis will make brick at Gallad, Tex.

Covington, Ky., is putting down brick pavements.

B. F. Long will erect brick works near Scottdale, Pa.

A new brick plant is being erected at Emeryville, Cal.

Wilmington, Del., will give brick pavement a trial.

Springfield, Mo., is in line putting brick on her streets.

The Aurora Brick & Tile Works had a \$400 fire recently.

Leavenworth, Kans., is to have a new vitrified brick factory.

An attractive map of the great State of Ohio is shown on page 289.

McClure & Raines have started a machine brick plant at Kappa, Ill.

The Haleysville, (Ala.) Brick Co., has been organized and will erect works.

The Elsinor (Cal.) Terra Cotta Works were burned August 31. Loss \$30,000.

The buildings in Kinley's brickyard at Breesport, N. Y., were burned the 1st, inst.

The Montrose Point, (N. Y.) Brick Works burned the 31st, of August. Loss \$15,000.

The South Zanesville, (Ohio) Clay Mfg. Co., has been incorporated. Capital \$10,000.

Galveston, Tex., is considering the paving question, and will likely give brick a trial.

Jno. Puerner, a well known brick maker of Jefferson, Wis., died Aug., 30th. Aged 65 years.

C. T. Harris, of Houston & Harris, Minneapolis, will establish a paving brick plant near that city.

The Newbern Brick Works Alton, Ill., will enlarge their capacity and build some new down draft kilns.

Lemon Thompson & Co., Northumberland, N. Y., are thinking of establishing a brickyard there.

There is a terra cotta company being organized at Port Jefferson L. I., N. Y., by Geo. E. Randall and others.

Grand Rapids, Mich., is putting down a large quantity of paving brick on some of her principal business streets.

The works of the Central Brick Co. at North Baltimore, O., which were burned recently, are rapidly being rebuilt.

Those of our readers who are interested in artificial dryers will find some entertaining matter on pages 211 and 212.

An excellent Dump Wagon is illustrated on page 248. Those who are using this wagon speak very highly of it.

Frank Bricker, an employe, was killed recently by a cave-in at the Aetna Brick Works, at New Cumberland, W. Va.

The Akron, (O.) Brick & Tile Co., will put in a complete outfit of machinery from the Frey-Sheckler Co., of Bucyrus, Ohio.

R. M. Pattillo, Cartersville, Ga., wants to purchase machinery, etc., for making tile, flower pots, terra cotta, jugs, tobacco pipes, etc.

P. Bannon, of Louisville, has purchased 50 acres of excellent clay land, and will erect a paving brick plant near Litchfield, Ky.

The Westmoreland (Pa.) Fire Brick Co. has been chartered, with capital stock of \$60,000, by John, Geo. and Chas. McGrew.

Decatur, Ill., was one of the first cities to adopt brick exclusively for street paving, and now has about thirteen miles of paved streets.

Jno. E. Pinkham, of Dover Point, N. Y., reports the brick business in that vicinity as very active, but prices ruling too low. About \$5.00.

The Reading, Pa., yards have been unable to work for two weeks or more, owing to protracted rains. They should investigate artificial drying.

The Indianapolis Terra Cotta Co., report an increased business for the year and are crowded with work. They will improve and enlarge their plant.

A subscriber at Rochester, N. Y., writes that this has been a dull season for brick makers in that vicinity. The demand has fallen far short of the previous year.

"The Chicago" is the name of a new stiff clay brick machine, manufactured by the Drake Standard Machine Works of Chicago. A cut of the machine is shown on page 283.

Louis Miller, Arcadia, Mo., is intending to erect a dry press brick plant in the lower part of that State, or, as he says, "The stepping off place, so if I fail I can step off into eternity."

A cut of the largest belt ever made is shown on page 271. It is a Leviathan, and was made by the Main Belting Co., for the Manufacturing Investment Co., Madison, Me. It is 78 inches wide, 110 feet long, and weighs 3,001 pounds.

C. L. Owens & Co., Hardeeville, S. C., are enlarging and improving their brick works. They have a No. 8 Brewer machine, just put in an Iron Clad Dryer, and will begin the erection of Morrison's kilns soon. They make brick for Charleston and Savannah.

A frightful accident occurred at the yard of the Jones Brick Co., near Knoxville, Tenn. James Luttrell, an employe, was caught while trying to adjust

a belt, his left arm torn off and he was otherwise so terribly injured that it is hardly possible for him to recover.

Jacob Slick "milled" by hand, without any assistance whatever, 12,000 fire brick in thirteen and one-half hours, in Reese, Hammond & Co.'s firebrick works, Bolivar, Pa. This, it is claimed, as the largest and heaviest work of its kind ever done in a firebrick works anywhere.

William C. Scott, a Chicago non-union bricklayer, began suit in the Circuit Court recently against the United Order of American Bricklayers and Stonemasons for \$10,000 damages. Scott claims to have been so harassed and annoyed by the defendants that he is unable to hold a job.

The Wallace Mfg. Co., Frankfort, Ind., so far this year have had all that they could do to supply the growing demand for their brick and tile machinery. They have out some new crushers (see pages 277 and 291) and will present other improvements in the near future. Their Automatic Cutting Table is a "howling success."

J. Geiger, Ashland, Ky., writes that the Company with which he is connected have a brick plant near there that is quite successful. They have a great quantity of fine clay and want to aid in establishing a pottery, tile works or paving brick plant near them. Parties looking for desirable location are requested to write Mr. Geiger.

Among the orders for Harrison Conveyors sold lately by Borden & Selleck Co. of Chicago, are Oscaloosa Paving Brick Co., Oscaloosa, Iowa, Messrs. Camp & Thompson, Cuyahoga Falls, Ohio, National Sewer Pipe Co., New Portage, Ohio. The fact that the Harrison Conveyor is constructed entirely of wrought iron and steel makes it especially adapted to the wants of clayworkers.

The Jeffrey Mfg. Co., of Columbus, Ohio, have in the hands of the printers, a revised Illustrated Catalogue and Price List showing all the chain links and specialties manufactured by them. A wrought chain is one of the latest additions to their already large list of chains. This company have the largest line of chain links from which to select, of any manufacturer in the world, and their list should be consulted by both the dealers and users of such machinery in general.

The U. S. Brick Press, which is well illustrated on pages 198 and 199 is demonstrating very strong points as an everyday brickmaker. This not to be wondered at, for this press is the product of brain and hand of skillful mechanical Engineers and clay experts, who, by study and experience, have learned both the desirable and undesirable features and principals involved in this the most modern method of brick-making. The manufacturers say they intend to introduce the press in Europe as well as throughout the United States, for they are confident it has no equal.

THE INDIANA STATE FAIR

Is one of the great events of the year to those interested directly in agricultural matters. The coming exhibition which begins Monday September 21st, and continues through the week, bids fair to be the largest and most interesting yet held.

Indiana as a State, has been specially blessed with good crops, good weather, good stock and good health. Prosperity is apparent on every hand, and the large premiums offered will attract immense exhibits, that in turn will draw the multitudes from all quarters Fletcher & Thomas of Indianapolis will exhibit the Quaker Brick Machine in operation, and E. M. Freese & Co., of Plymouth Ohio, will have running a full line of their brick and tile machinery.

KILN PLANS.

A large number of brickmakers are availing themselves of the opportunity to obtain complete building plans of the central flue, round down-draft kiln at a small outlay. The plans and specifications are invaluable as a means of reference, and are worth many times the price asked for them. Address P. Arnold, Supt. Dover Fire Brick Co., Canal Dover, Ohio. 7. ff. d.

Mrs. Burton Harrison, the author of "The Anglomaniacs," has written a new novel of New York life which *The Century* will print. It is said to deal with divorce.

NEW BRICK AND TILE MACHINERY.

Editor Clay-Worker:

Your proof of our ad. for the September number of the CLAY-WORKER to hand and as usual we find it O.K. and very satisfactory. We will very soon have electrotypes for the CLAY-WORKER of three new Brick and Tile Auger Machines which we have just perfected. In fact we have put the most of our time during this year in getting out this new machine which we think are the most complete Auger Machine on the market. They are strong; of superior workmanship, yet simple and not liable to breakage, and of large capacity for the price. We have also perfected, and are now manufacturing three sizes of upright pug mills. They are wholly of steel and iron very strong and a grand mixer of clay, doing more to improve the product on the brick yard than any other improvement we have made for some time. Also two sizes of horizontal conveyers which assist greatly in mixing the clay. A winding drum etc. All of which we will send electrotypes of and will illustrate in the CLAY-WORKER in the near future. In the meantime we will be pleased to send you or any intending purchaser of brick and tile machinery photographs of any of these new and perfected machines that they may be interested in. Yours Truly,

Michigan Brick & Tile Machine Co.,
BY JOHN H. CAMPBELL, SEC'Y.
Morenci, Mich.

ALBANY SLIP CLAY.

We have a large bank of a superior quality of SLIP CLAY. Price very low by barrel or carload. Best of reference as to quality. Address

JACKSON BROS., Albany, N. Y.
N. Y. State Drain Tile and Pipe Works.

WANTED. Situation as superintendent of brick works by a sober, industrious man—fifteen years experience. Can give plans and estimates for erection of new plant. Can build and work either up or down draft kilns. First-class references. Address, A. C. S., 9. 1 p. 1. Care Clay-Worker.

FOR SALE. A large tract of valuable clay land, well situated as to railway facilities, in a rich country. The clay deposits have been thoroughly tested, are excellent in quality and inexhaustible. The property consists of about 1,000 acres of well-timbered land in fee simple and mining rights on about 500 acres more, including a good location for erecting works close to railroad. For full particulars, address, Box 30, 9. — Care Clay-Worker.

IMPORTANT TO BRICKMAKERS.

VIRGINIA, ILLINOIS, Aug. 31, 1891.

The City of Virginia offers to contract for 50,000 paving tile, $8\frac{1}{2} \times 8\frac{1}{2} \times 2$ in., at \$25.00 per thousand, for a period of ten years; said brick to be manufactured at Virginia, Illinois.

We have a good vein of Potters' Clay, plenty of Coal and Water, all at one place, viz., in the Coal Shaft. The Clay was examined by Mr. Worthing, State Geologist, and pronounced Potter's Clay of good quality.

For any further information, apply to

JOSEPH WILSON, }
W. L. BLACK, } Committee.
L. H. BRISTOW, }

L. H. BRISTOW, City Clerk.

9. 3. c.

Brick Moulds
GUARANTEED
STRONGEST MAKE
G. GOLDEWE & CO.
829 SIXTH ST. MILWAUKEE, WIS. SEND FOR CIRCULAR



THE MOST SUCCESSFUL Dry Clay Brick Machines

Are those invented and patented by Joseph J. Kulage.

For proof of this statement together with guarantee, etc., address

JOS. J. KULAGE,

1435 College Ave., ST. LOUIS, MO.

THE AMERICAN CYCLES
AMERICAN RAMBLERS
AMERICAN CHAMPIONS



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Branch Houses: 178 Columbus Ave. BOSTON, MASS.
1325 14th Street N.W. WASHINGTON D. C.
Illustrated Catalogue Free.

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Worth Knowing.

That the BUCYRUS GIANT Brick Machine, manufactured by the Frey-Sheckler Co., of Bucyrus, Ohio, is meeting with unparalleled success in the manufacture of Street Pavers, and demonstrating that its capacity, durability and strength are unlimited.

They have met with such gratifying success with the BUCYRUS GIANT that they are now making a Giant Machine of smaller capacity to meet the requirements of customers who require less capacity than that of the BUCYRUS GIANT.

The small Giant retains all the essential features contained in the large one.

They also manufacture a large variety of Cutting Tables especially adapted for use with their large machines.

The Canton Brick Co., of Canton, Ohio, very extensive manufacturers of the finest quality of Street Pavers made in the United States, are using the BUCYRUS GIANT, and say of it as follows:

CANTON, OHIO, August 31st, 1891.

THE FREY-SHECKLER CO,
BUCYRUS, OHIO.

GENTLEMEN:—The Bucyrus Giant Brick Machine purchased from you last Winter has been in constant use since and has turned out on an average about 35,000 brick daily, many days over 40,000 being made, our out-put being governed by Dry-floor and Kiln capacity.

The capacity of the Machine seems almost unlimited, and if brick can be cared for 50 to 60,000 could be made as well as less.

We have not had a single break, nor lost an hours time on account of the Machine, and this means a great deal to us, after two years experience with smaller and lighter Machines.

Three very important qualifications for a good Brick Machine are combined in the Bucyrus Giant, namely, strength, durability and capacity.

No mistake can be made by any brickmaker who wants to make brick by buying the Bucyrus Giant.

Yours Very Respectfully,

THE CANTON BRICK CO.

For catalogue giving full description of the GIANT and an extensive line of Clayworking Machinery, address THE FREY-SHECKLER Co., Bucyrus, Ohio.

See ad. on page 285.

THE CLAYWORKER.

VOL. XVI.

INDIANAPOLIS, IND., OCTOBER 15, 1891.

No. 4

Written for the Clay-Worker.

EXAMPLES OF AMERICAN BRICK AND TERRA COTTA WORK.

No. 41.

THE modern residence is incomplete without its brick mantel, be it large or small. The reception hall seems to be the place assigned for it, where, with its mellow color, it readily falls in harmony and blends with the warm tone of decoration one expects to find on entering.

The brick mantel is steadily growing in favor and now one finds them on every hand; some plain and capped with a simple oak shelf, others extending to the ceiling and terminating with a cornice, upon which rest the deep molded beams of the ceiling. The mantel shown in the accompanying engraving is a design made for Anthony Ittner, of St. Louis, of brick manufactured by himself, and represents to what perfec-

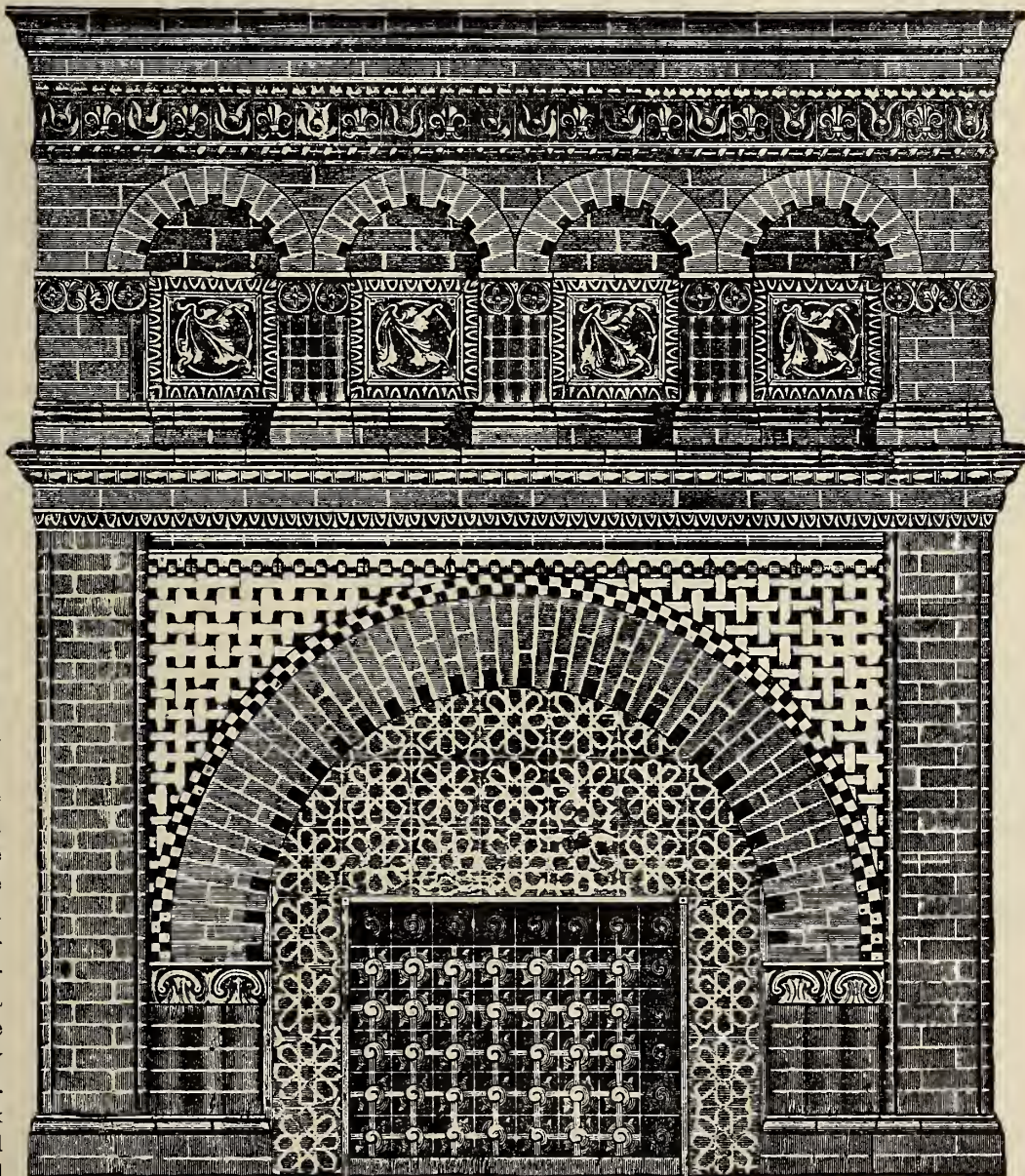
tion the brick mantel can be wrought.

The large arch spans a recess with a Moorish background, in which the fireplace proper is set, the pilasters at the side extending up and supporting a shelf from which spring the smaller arches; the whole terminating with a rich frieze and cornice. The spandrels

over the large arch are filled in with an interwoven pattern, the whole making a very rich, harmonious effect.

“DOES labor-saving machinery throw men out of employment?” asked the president of a St. Louis machinery company. “On first thought one would

be inclined to answer this question in the affirmative, but after maturer consideration, only a negative answer can be given. The name ‘labor-saving’ is misleading; it does save labor in one way, but at the same time it gives employment in another. Take, for example, the steam engine, the most common of all labor-saving machines. For every man it has thrown out of work, a thousand have been given employment. The harnessing of steam has broadened every industry and thrown open thousands of new avenues to the working classes. And so with labor-saving ma-



BRICK MANTEL—WILLIAM B. ITTNER, ARCHITECT, ST. LOUIS, MO.

chinery. Inventive genius has done and is doing more to develop and expand new industries than all other forces combined."

TOM JOHNSON'S QUIT.

A Passel 'o the boys last night—
An' me amongst 'em—kindo got
To talkin' Temper'ncc left an' right,
An' workin' up "blue-rihbon," *hot*;
An' while we was a-countin' jes'
How many had gone into hit
An' signed the pledge, some feller says,—
"Tom Johnson's quit!"

We laughed, of course—'cause Tom, you know,
He's spiled more whisky, boy an' man,
And seed more trouble, high an' low,
Than any chap hut Tom could stand:
And so, says I "He's too nigh dead
Fer Temper'ncc to benefit!"
The feller sighed agin, and said—
"Tom Johnson's quit!"

We all *liked* Tom, an' that was why
We sorto simmered down agin,
And ast the feller ser'ously
Ef he wa'n't tryin' to draw us in:
He shuck his head—tuck off his hat—
Helt up his hand an' opened hit,
An' s'ys, says he, "I *swear* to that—
Tom Johnson's quit!"

Well, we was stumpt, an' tickled too,—
Because we knowed of Tom *hes* signed
Ther wa'n't no man 'at wore the "blue"
'At was more honest inclined:
An' then and there we kindo riz,—
The hull dern gang of us 'at hit—
An' th'owed our hats and let'er whizz,—
"Tom Johnson's quit!"

I've heerd 'em holler when the halls
Was huzzin' 'round us wus'n hees,
An' when the ole flag on the walls
Was flappin' o'er the enemy's,
I've heerd a-many a wild "hooray"
'At made my heart git an' git—
But Lord!—to hear 'em shout that way!—
"Tom Johnson's quit!"

But when we saw the chap 'at fetched
The news was'n't jinin' in the cheer,
But stood there solemn-like, an' reched
An' kindo wiped away a tear,
We someway sorto 'stilled agin,
And listened—I kin hear him yit,
His voice a-wobblin' with his chin,—
"Tom Johnson's quit—"

"I hain't a-givin' you no game—
I wisht I was! . . . An hour ago,
This operator—what's his name—
The one 'at works at night, you know?—
Went out to flag that Ten Express,
And secs a man in front of hit
Th'ow up his hands an' stagger—yes,—
Tom Johnson's quit."

—JAS. WHITCOMB RILEY.

HER VIEW OF IT.

"Hmh!" said Mr. Wickwire, "here's a great story in this paper. It appears that a man advertised for a boy and the same day his wife presented him with twin sons. If that does not show the value of advertising, what does it show?"

"It shows that if he had confided his business affairs to his wife, as a man ought to, he might have saved the expense of the advertisement," answered Mrs. Wickwire.

Written for the Clay-Worker.

ROOFING TILES.

I HAVE failed to connect with the tile samples provided for drawings in connection with articles on tile roofing. While there is material at hand which might be available in that connection I prefer to wait until I can re-arrange my plans and secure other samples.

Just now I am in a slate Country on the West coast of France in Brittany. Nothing can be cheaper than this slate covering. Certainly it is cheaper than wood is with us, labor commanding not more than twenty-five to thirty cents a day. Yet the railway companies and those in control of some of the public buildings in this section choose to use tiling, which indicates their opinion of this material, even where the slate is much cheaper. A little farther South I saw tile coverings of a pattern which I illustrated some months ago, which had been in use four or five hundred years and are yet in perfect condition.

On one of the buildings of an old Chateau I saw a tile roof yet different from anything which has been illustrated. I show it in Fig. 1. The tiles are mere half cylinders lapping one over another with alternative convex and concave surfaces showing to the weather. The Chateau itself dated back to the fifteenth Century. This tile makes a very picturesque roof, and one which sheds water very well, forming, as it does, a series of gutters. However, it is not a warm roof, giving very little protection from the cold air to the part immediately under it. In the case of which I speak, the ceiling was vaulted and a little cold air driving in had no effect upon the general interior.

Nearly all slate roofs and dormers throughout this section are provided with terra cotta ridge copings of a very simple type. They are the half cylinders without lap joints at the ends, and merely lie down over the slate. They are cemented to this covering, and the joints at the ends of the copings or cylinders are made by plastering over with the cement. In truth, in connection with all roofs in this section, a very large use is made of cement and plasters, a method little known in general practice in America. While we sometimes make use of cement and plaster for such purposes, it is in no means general. For instance, it would be decidedly unusual to see a ridge coping on a tile roof made with cement only, or to see valleys thus formed where dormers joint

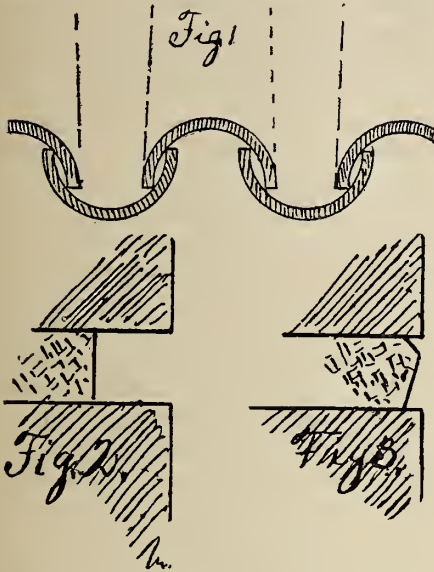
against the roof covering. The Spanish tiles used in America have been laid in cement, and this fact has contributed to their cost and unpopularity.

Without urging the use of cement in this way for the reason that it is not necessary, as light coverings can be made and applied without this material, I wish to call your attention to the fact that when our people learn how to make and use mortar and cements of a better general character, they will contribute more largely to the use of clay products where stone is now used. It is no uncommon thing in this section to see a stone wall with a brick coping, brick bands or brick decorations. I have seen many buildings of stone where the window and door trimmings, the external angles in all the walls were of brick. Oftentimes the wall is made of concrete or stone, and the windows and corners of brick, while the stone surface is covered with plaster, giving the effect of a smooth stone building with the brick trimmings.

In this connection, I wish to call attention to the brick joints which are here used. It is to be noticed that the mortar is more than a quarter of an inch back from the face of the bricks, as indicated in Fig. 2., and is a perfectly square joint. It is very common in America to make a joint like that shown in Fig. 3. This is done by cutting down with the trowel from above and trimming with the knife and straight edge to the upper edge of the joint. But the method which I see in use here of having the joints farther back and having them perfectly straight with the smooth surface gives a better appearance than in our American practice. A very ordinary brick with a bad edge, with the method that I here see in use, shows much better than it really is. No matter how carefully the American joint may be made the mortar will smear a little on the face of the brick, and to that extent make the joint look large and uneven, and even more irregular on the edge than it really is, while, as said before, the Foreign joint appears smaller than it really is and improves the appearance of the brick. The shadow from above, and the view of the part of the joint that is cut off in looking at it from below makes it appear altogether much smaller than it is. This joint is made by rodding as with us, though the extra depth is in its favor.

The matter of mortars and cements is one of interest to brickmakers and is

well worthy of agitation. Anything which will serve to make a better or cheaper brick house will increase the use of brick. A great many people in America, as the writer knows, build frame houses because they are so much cheaper. The cost of the brick is not so much the item as that of the stone work which is thought necessary to put with it. We see in England, as well as



on the Continent, not alone brick trimmings, but brick sills, brick water tables and decorations with simple forms of brick to an extent altogether unknown with us. With a little more study and a little more agitation along this line, our brickmakers and those interested with them may do not a little for themselves, but for the general public as well, by encouraging any movement which will increase the proportion of brick houses in America.

I saw a brick floor in the stable of a Chateau which had been down for forty years. It was subjected to constant use during all that time. The brick were laid in cement on a concrete base, and I have no reason to doubt that this floor is good for quite forty more years. I find that a brick floor for stables is the regular thing in all first class establishments on this side, and has been so for many years, though this material is not largely used for streets. Just why this is true I do not know. Belgium has used brick in the streets more than other sections, though it is by no means general. Its use as stable floors has certainly been sufficient to afford data indicating its real value as a street or road covering, and I am pleased to add the above facts to the testimony which is now pouring in from all sides in

favor of brick pavements in America.

Since seeing the beautiful macadamized roads in this section, than which nothing can be better, I have thought of many of our bad roads in the country. There are sections with which I am familiar in which broken stone for the macadam is not available. It has occurred to me that where fuel is cheap clay might be burned very hard, properly broken and formed into a macadam road. Not that this would make a cheap road, but it would be certainly cheaper than hauling broken stone a long distance by railroad and teams, and would give a covering much more satisfactory, and at the same time one exceedingly profitable to the community at large on account of providing a more economical means of transportation of farm products to market. There is no place where one may notice just what this sort of economy means more than in France. We see one horse drawing a two horse load with ease because the roads are good. The cost of new horse flesh, new wagons and repairs thereon and as well the added time of transportation, means a great saving over and above what is common with our bad roads; which at times are all but impassible. May it not be that burned clay will be one means of solution of the ordinary farm road problem in America where broken stone is not available?

During my journeying of the last month, passing through many towns and villages in size from a few hundred inhabitants to six and eight thousand, I have seen nothing which suggests a fire department or the need of one. Even insurance is a rare thing. People say: "We have no fires; why should we have insurance?" What a strong contrast with the experience in our own Country. Yet I see a large use made of tile flue linings in the newer buildings of an important character in this section. There is the same care in the building of flues that there would be if fires were frequent. The builder who would make a flue so carelessly as to cause trouble would, in this section, find his occupation gone. However, it is not the flues alone which cause our trouble. It is the cheapness of wood and consequently the prodigal way in which it is used.

We often hear the question asked at home: "What will we do for lumber when we have cut down our forests? When one sees the result of high priced lumber in this Country where it is very scarce and very dear he feels like saying: "Speed the day in America when the same thing will come about." Then with the careful use of wood and a prodigal use of clay products and cement and plaster we may expect a diminution of the greatest tax paid by the American people; viz, the fire tax. In the structures which we see framed with wood with the framing showing to the outside, the filling is made with brick and covered over with plaster. We see many of these buildings which have been standing for four or five hundred years which look as though they were good for much longer.

I send a sketch of a chimney piece made from the interior of an old Britany house. It dates back four hundred years and shows the origin of many designs in terra cotta of a latter period some of which we are now using. The fine mantels of one or two Centuries later which we see in the Chateaus and Architectural Museums of France, frequently follow the same general design, the only addition being the decoration of the plain surfaces. The design which



is here given can be constructed in the same form in brick and terra cotta, and may serve as a suggestion to some of our manufacturers of this material, in carrying out a design in their own homes if not in those of others. The plain surfaces under the upper decorated band could be decorated, and as well the mouldings of the corbels and else-

where, as an artistic instinct would suggest.

LOUIS H. GIBSON.

Le. Faout, Brittany, Aug. 20th, 1891.

Written for the Clay-Worker.

CALCINING CLAY.

BY ALFRED CROSSLEY.

THE practice of calcining clay for use as a mix with raw clay is followed in many branches of the clayworker's art, and in some departments it is an absolute necessity. The object sought however is by no means the same in every instance. Fire clay is more usually operated on in this way than ordinary brick clays. In fact it is rarely, if ever, the case that the latter are calcined for use in ordinary brick manufacture. There are three distinct objects for which the use of calcined clay is practiced. First, to assist the drying and prevent warping and cracking. Second, to counteract shrinkage. Third, to promote refractoriness.

In making large sized clay-blocks, a proportion of ground calcined clay facilitates drying by keeping the body more open, and thus allowing the moisture to escape, and also, by reducing the volume of moisture,—charged substance by the proportion of calcined clay used, thus enabling the ware to dry more uniformly, and reducing the tendency to warp and crack. In fact, in many cases, without the use of calcined clay these goods could not be successfully produced. The practice of using more or less burnt stock in fire clay shape work is therefore well nigh universal.

In the manufacture of architectural terra cotta, calcined clay is used for the same purpose as just explained, and its utility even more realized than in the previous case. The best terra cotta clays are fine grained and highly plastic. These qualities, while conducting to the beauty, strength, and durability of the product, render the drying of large blocks with safety almost an impossibility, owing to the tendency to warp and crack, even when the clay has been carefully prepared. This tendency can be overcome to a great extent, by the admixture of a suitable proportion of sand of the proper grain and color. But if a sufficient quantity is used to accomplish the object named, it will often result in deterioration of the work in the element of cohesive strength. By the use of ground calcined clay, instead of sand, the object is attained and with

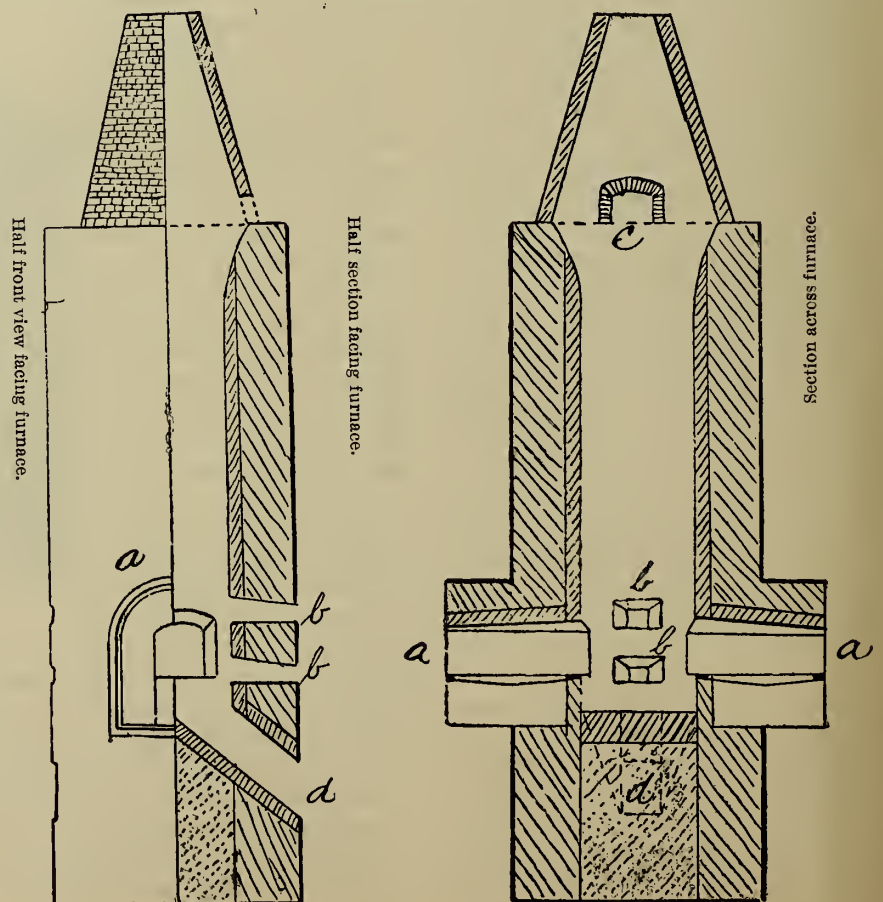
better results, as the material used, both raw and calcined, being the same clay. The finished product is homogeneous in character.

The value of calcined clay is again shown in the reduction of shrinkage or contraction in burning. In terra cotta work particularly this is a very important matter. This material being used principally on the better class of buildings. The different parts must fit each other as near as possible, mathematically correct. By the use of a definitely ascertained proportion of calcined clay a more uniform and reliable shrinkage in burning can be obtained. An equally, if not more, important matter is, that by the admixture of calcined clay the lines and surfaces can be more correctly maintained. Good terra cotta clay often contracts considerably in burning, and hence the arrises and surfaces are pulled out of shape. By calcining part of the clay before using, the shrinkage of that part is done in the rough, and when ground fine and mixed with the raw clay it lessens the contraction of the ware just in proportion to the quantity used. Thus, if the contraction of the raw clay is one and a half-inches to the foot, and one third part calcined clay be used,

the contraction of the mixture will be one inch to the foot.

In the manufacture of fire clay wares the third use of calcined clay appears viz: To promote refractoriness. This is the principal object of its use in fire bricks; although, as before explained, it is also used to facilitate safe drying. It can hardly be proved that *all* clays are increased in refractory power by calcination, but, on the other hand, many undoubtedly good fire clays are obliged to be thus treated. The difference lies entirely in the nature of the clay. The principal involved is that plasticity is opposed to refractoriness. The *non-plastic* or flint fire clays, when ground for use, have *naturally* the proper grain required in a fire brick that has to stand high heats and sudden changes of temperature. In all *plastic* fire clays this condition has to be obtained *artificially* by calcining the proportions required, which varies according to the plasticity of the clay. Calcined fire clay is technically termed "Chamotte," and in some places is locally named "Cement." Considerable divergence of ideas has arisen at different times as to the use of calcined clay in fire bricks, and it has been used doubtless in many cases with

STYLE A.



with but very imperfect and erroneous ideas of its functions, and hence mysterious virtues ascribed to it. As it is not the purpose of this short article to discuss the relative merits of fire bricks made with and without calcined clay, the above is all that need be said upon this part of the subject, further than to state again, unequivocally, that all of the *plastic* varieties of fire clay, however pure they may be in chemical composition, must have a proportion of calcined clay mixed with it, in order to the production of a first quality fire brick.

In the manufacture of glass pots and crucibles, a proportion of calcined clay, from 25 to 30 per cent. upwards, is used. The object here is two fold, first, to assist the drying, and second, (and most important,) to reduce the shrinkage of the pots when they go in the furnace, which will be more readily understood when it is stated that these things are simply dried, without being burnt, before they are used. It is very important to have as little shrinkage as possible, as the rule is that the liability to crack is in proportion to the shrinkage, and, of course, the more well calcined clay is used in the mixture, the less will be the contraction.

The uses here enumerated are the principal ones in which calcined clay is used in the art. There is another notable use to which calcined clay has been applied, in the West principally, and that is as ballast and road material for railway tracks and country roads.

In calcining fire clay, the raw clay as it comes from the mine or pit is used, and of this the lumps are preferable for this purpose. The reason for this is that the small or fine clay is more trouble to handle and to burn. The lumps can be more easily placed in the kiln and the fire can get a draft through between them. Of course a certain quantity of small or fire clay can be used along with the lumps. Two points here should be observed. First, it should be dry when set, or it will be liable to fall in the kiln and obstruct the draft. Second, it should also be freshly mined, as, if exposed to the weather too long it falls to pieces and cannot well be handled. These remarks are intended to apply more particularly to the clays of the coal measures, which are either non-plastic or plastic come out of the mine in hard blocks. The soft plastic clays, either fire clays or terra cotta clays, that can be dug out of the bank

in chunks or blocks, must be dried before being burnt, and can then be treated in the same way as just described.

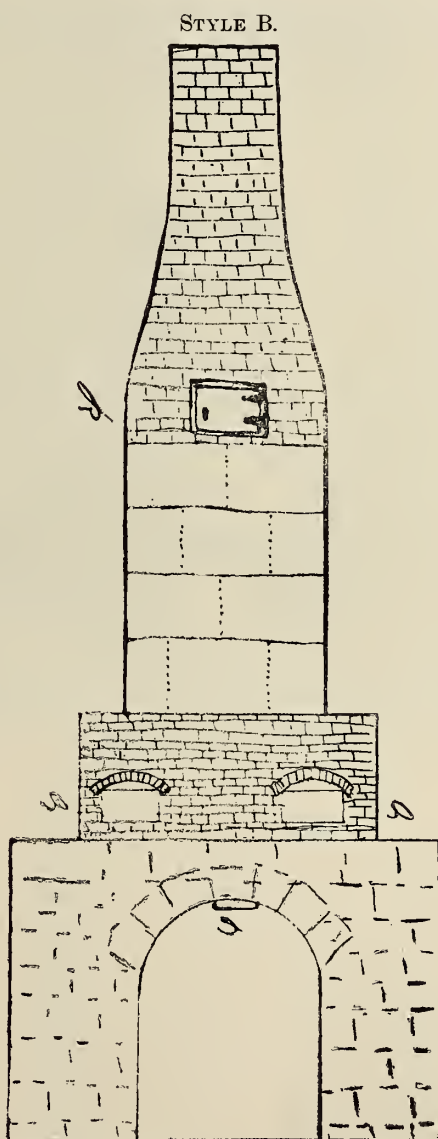
The process of calcining may be accomplished in several ways, according to the quantity required. It may be burnt along with the bricks, and in some places it has been the custom to set a certain quantity of clay on top of every kiln, and thus obtain the required regular supply. When ordinary care and common sense is used this is a convenient method, where a limited quantity only is required, but if carelessly done the result may be a spoiled kiln. Where a large quantity is required it is best to burn the clay by itself. This can be done in a very

same way. Alternate layers of wood and clay are piled up together as high as convenient, the sides being well battered or sloped to prevent falling, and care being taken to have the clay well surrounded with wood, and also a sufficient quantity of wood used to thoroughly burn the clay. Another method is to build small up-draft kilns, round or square, especially for the purpose, and fire in the same manner as a brick kiln, with wood or coal. Of course, some care is required in setting, so as to get safely over the arches. At Mount Savage Fire Brick Works, small round down-draft kilns, built especially for the purpose are used. The best and most practical plan of all, where a regular supply of calcined clay is required, is to use a kiln on the same principal as the modern lime kiln. In this kiln the process never stops; except when the kiln has to be shut down for repairs or other special cause. The construction of the kiln is such that as the clay burns it can be discharged at the bottom of the kiln without interfering with the fires; fresh clay is fed in at the charging hole at the top, and the operation is continuous. Beside the great advantage of the steady and constant supply, it has also the advantage of using smaller or finer clay, and it is not so necessary to pick out all lumps.

The clay in calcining should be burned nearly, or, quite, as hard, as fire bricks themselves, although, of course, it is not quite as particular. The great point is to get out all the shrinkage. Unless the clay is burned hard enough to accomplish this a large measure of the advantage is lost.

The writer recently tested a sample of clay (kaolin) from South Carolina, in which this point was fully demonstrated. This clay was of excellent chemical composition, very refractory when put to the first test, but developed excessive shrinkage. The only way to produce a sound fire brick from it was to first calcine a large proportion of the mix, and it required to be burnt hard in order to avoid subsequent further contraction.

The accompanying sketches are of two styles of calcining kilns for continuous operation, such as above referred to. Referring to sketches, style A., a. a. are the furnaces; b. b. sight and air holes; C. charging door; d. discharging. These are drawn to scale $\frac{1}{2}$ equals 1 foot. The inside lining is 9. Fire brick, backed up with common bricks, and



primitive fashion where cord wood is plentiful and cheap. These familiar with the old method of burning lime or ore in clamps or open heaps would have no trouble in burning clay the

enclosed in a shell of three sixteenth's boiler iron. The height of the conical shaped stack will vary with the kind of clay to be burned; some requiring a stronger draft than others.

Style B., is a rough sketch and not drawn to scale; a. a., are the furnaces; b. charging door; c. discharging hole. The hub is 10 feet diameter inside; cupola 5 feet diameter; height of hub above base 3 feet; height from top of hub to charging door $10\frac{1}{2}$ feet; height from charging door to top of stack 18 feet.

The latter style is in regular use at Mexico Fire Brick Works, Mexico, Mo. The fires are kept going continuously and its capacity is 20 tons of calcined clay in twenty-four hours.

There are still other styles of kilns in use at different places, but the principle on which they work is practically the same in all of them.

(Copyrighted.)

DURABILITY OF BRICK PAVEMENTS.

BY IRA. O. BAKER, C. E.

§19. Notice that according to Table II, brick No. 1 lost 0.8 per cent. during the third half hour in the rattler, and that brick No. 10 lost 3.7 per cent. In the rattler the loss of brick No. 10 was then 4.6 times as much as brick No. 1. Notice also that 15,250 tons (see §15) wore 1 per cent. from brick No. 1, while 3,560 tons (see §17) wore 1 per cent. from brick No. 10. In the pavement then, the loss of brick No. 10 was 4.0 times as much as brick No. 1; while in the rattler, the loss of No. 10 was 4.6 times that of No. 1. Considering the nature and method of investigation, and particularly that the figures for the loss in the rattler are possibly considerably in error owing to omitted decimals, the agreement is reasonably close. This then is a fairly good check upon the preceding investigation.

Notice that brick No. 1 lost 0.8 per cent. in the rattler during the third half hour, and that in the pavement 15,250 tons per foot of width caused a loss of 1 per cent.; therefore, we may assume that the third half hour in the rattler was equivalent to a traffic of 12,200 tons (equal to 15,250 multiplied by 0.8) per foot of width of pavement. Or, we may

reason backward from brick No. 10 to brick No. 1 thus: 3,560 tons wore 1 per cent. from No. 10, and since brick No. 10 lost in the rattler 4.6 times as much as No. 1, then the latter should require 4.6 times 3,560 tons or 16,364 tons to wear off 1 per cent. This is smaller than the result deduced above, but as the tonnage was more accurately measured in the first case that result will be used as the basis of further comparisons. 19,000 tons is the same as a daily traffic of 39 tons for 313 days, *i. e.*, one year omitting Sundays.

The wear of the brick in the pavement is due to three causes, the wheels of vehicles, the feet of horses, and the

traffic, any error due to the effect of the weather will be on the safe side.

LIFE OF BRICK PAVEMENTS.

§20. The first part of Table VII gives the data concerning the traffic on several streets of various American cities. The data are from a paper, "An account of Some Observations of Street Traffic," by Captain Francis V. Greene a member of the American Society of Civil Engineers, published in Vol. 15 of the transactions of that society. Concerning the method of making these observations Captain Greene says:

"The observations were made under my direction during the months of October and November, 1885, by the employes of the Barber Asphalt Paving Company, which has an office and works in the ten large cities, viz.: New York, Philadelphia, Chicago, Boston, St. Louis, New Orleans, Washington, Buffalo, Louisville and Omaha. In the arrangements for taking two objects were kept in view: first, to leave as little as possible to the judgment of the observer; and second, to make the record permanent, so that it could be preserved for examination in all its details at any time.

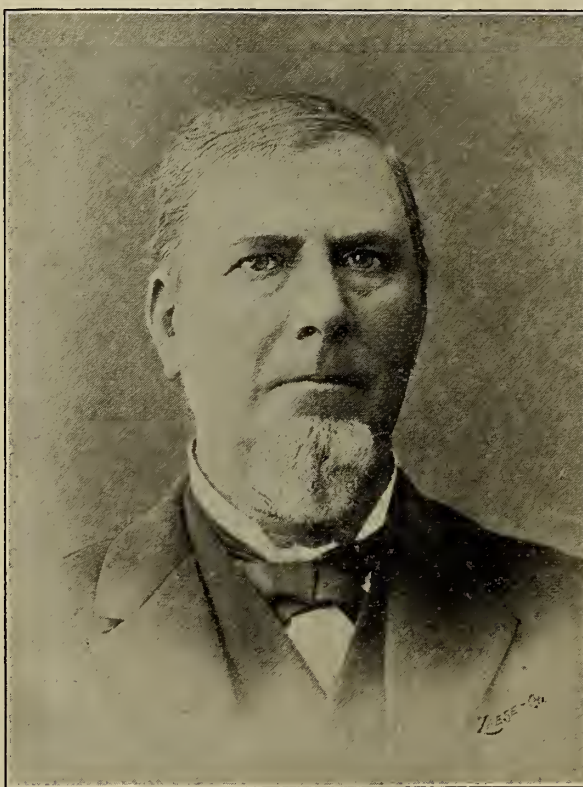
"The agent in each city was instructed to select the three streets in that city paved with stone, asphalt and wood (if any existed), which, by common report, had the heaviest traffic in the class of pavement used on that street. The record was in every case made on six consecutive days (Sundays omitted) at the same place, and it was continuous from 7 A. M. to 7 P. M., except when darkness prevented. No addition was made for this omission, no record was kept during the night, and no

addition was made as an estimate of night traffic.

"The printed instructions issued to each observer contained the following rules as a guide in estimating weights:

1-horse carriages, empty or loaded.	} Less than 1 ton.
1-horse wagons, empty or light-loaded.	
1-horse carts, empty.	} Between 1 and 3 tons.
1-horse wagons, heavy loaded.	
1-horse carts, loaded.	
2-horse wagons, empty or light loaded.	} Over 3 tons.
Wagons and trucks drawn by two or more horses, and heavy-loaded.	

"Special note will be made, in the column of remarks, of any unusually heavy loads, such as 6-horse trucks loaded with stone or iron, and an estimate given of their weight."



JOHN CUBBINS, BRICK MANUFACTURER, MEMPHIS, TENN.

action of frost, etc. The effect of the first two is about proportional to the tonnage passing over the pavement, while the last depends mainly upon the length of service and is therefore nearly independent of the amount of traffic. In the examples employed to establish the conclusion of the preceding paragraph, the traffic was comparatively light, and hence the effect of the weather was comparatively great; therefore, if the relation between wear in the rattler and service in the pavement as found in the preceding paragraph, be employed to compute the probable life of brick in a street having a comparatively greater

TABLE VII.

PROBABLE LIFE OF THE SEVERAL SAMPLES OF BRICK IF LAID IN CERTAIN STREETS OF SUNDRY PROMINENT CITIES

CITY.	STREET.	Width in feet.	DAILY TONNAGE.			NUMBER OF YEARS REQUIRED TO WEAR OFF 100 PER CENT. FROM THE SAMPLE NUMBERED.											
			Total.	Per Vehicle.	Per foot of Width.	1	3	5	6	7	8	9	10	12	14	15	
New York.....	Broadway, near Pine.....	40	10,905	1.39	273	14	16	6	28	4	9	6	3	10	24	14	
New York.....	Fifth Ave., opposite Worth Mon't.....	40	3,740	.68	94	41	45	16	83	11	26	18	9	28	69	41	
New York.....	Wall, cor. Broad.....	27	2 357	1.00	87	40	50	18	90	12	28	16	10	30	74	44	
Boston.....	Devonshire, opposite Post Office.....	27	5,301	.99	196	20	22	8	40	5	13	8	4	13	33	20	
Boston.....	Devonshire, near Milk.....	32	5,028	1.02	157	25	27	10	50	7	16	10	5	17	41	25	
Boston.....	Kilby, near State.....	26	3,265	.93	126	31	34	13	62	8	19	13	7	21	52	31	
Boston.....	Washington.....	39	2,938	.80	75	52	57	21	104	13	33	21	11	35	86	52	
Boston.....	Arch, near Sumner.....	26	1,130	.79	43	92	100	36	182	24	56	38	20	61	147	92	
Boston.....	Court Square.....	24	744	.67	32	122	134	49	244	32	76	51	27	79	203	122	
New Orleans.....	Tchoupitoulas, near Poydras.....	40	6,204	1.81	155	25	27	10	52	7	16	10	5	17	41	25	
New Orleans.....	St Charles, near Washington.....	30	1,065	.94	35	112	123	44	223	29	70	47	24	75	185	116	
Chicago.....	Wabash, near Lake.....	50	7,561	2.08	151	26	28	10	50	7	16	11	6	17	43	26	
Chicago.....	Clark, near Madison.....	45	6,398	1.46	142	27	30	11	55	7	17	12	6	19	45	27	
Chicago.....	La Salle, near Locust.....	36	2,756	.90	77	50	56	20	101	13	31	21	11	34	84	50	
Chicago.....	Dearborn, opposite Washington Park.....	38	2,604	1.11	69	56	62	22	112	15	35	24	12	38	93	56	
Philadelphia.....	Broad, in front of Penn. R. R. Depot.....	65	9,237	1.52	142	27	30	11	55	7	17	12	6	19	45	27	
Philadelphia.....	Filbert, in front of City Hall.....	65	6,302	1.24	97	40	44	16	80	10	27	17	9	27	67	40	
Philadelphia.....	Chestnut, cor. of 4th.....	26	1,928	1.06	74	53	58	21	105	14	33	22	11	35	87	53	
St. Louis.....	Locust, near Beaumont.....	36	3,691	1.13	103	38	41	15	75	10	29	16	8	25	63	38	
St. Louis.....	Broadway, near Olive.....	50	3,618	1.23	72	54	59	21	108	14	34	23	12	36	90	54	
St. Louis.....	Pine, near Garrison.....	36	2,554	1.16	70	56	62	22	112	15	36	24	12	38	94	56	
St. Louis.....	Chestnut, near Beaumont.....	36	942	.90	27	145	160	58	291	38	90	61	31	92	240	145	
St. Louis.....	Olive, near Beaumont.....	36	259	.84	7	562	619	225	1125	148	352	236	122	374	932	562	
Louisville.....	Main, near 3rd.....	61	4,176	1.25	69	57	62	23	114	15	36	24	13	38	95	57	
Louisville.....	8th, near Walnut.....	36	2,402	1.05	67	58	64	24	117	16	36	24	13	39	91	58	
Louisville.....	7th, near Jefferson.....	35	977	1.05	28	140	150	56	280	36	87	58	30	93	232	140	
Washington.....	15th, opposite Treasury.....	70	4,622	1.02	66	60	66	24	120	16	38	25	13	40	100	60	
Washington.....	9th, between D and E.....	50	1,688	.87	34	115	126	46	231	30	72	49	25	80	192	115	
Washington.....	7th, between D and E.....	50	1,445	.88	29	135	149	54	266	36	82	57	38	90	225	135	
Washington.....	6th, between Pa and B.....	60	1,289	1.01	21	196	205	75	373	50	116	78	60	124	309	196	
Buffalo.....	Main, near Swan.....	56	2,613	.83	47	84	92	33	167	21	53	35	19	56	139	84	
Buffalo.....	Main, near Bouck.....	42	1,505	1.88	36	109	120	44	218	29	68	46	24	73	181	109	
Buffalo.....	Linwood, near Ferry.....	38	825	1.47	22	178	196	71	357	47	112	75	38	119	296	178	
Buffalo.....	Main, near Glenwood.....	50	714	1.24	14	280	308	112	559	73	175	117	61	186	464	298	
Omaha.....	Douglass, near 15th.....	63	2,967	.62	47	84	92	33	167	21	53	35	19	56	139	84	
Omaha.....	Farnham, near 14th.....	60	1,449	.59	24	164	180	65	327	43	102	69	36	109	271	164	

"The traffic is divided into three classes, light weight (less than one ton), medium weight (between one and three tons), and heavy weight (more than three tons); and in order to reduce the personal equation of the different observers to a minimum, the directions specify what classes of vehicles are to be counted in each class of weight. Nothing is then left to the observer's judgment and estimation except the question of 'heavy' and 'light' loads in one-horse and two-horse wagons. The result of different estimation in this respect between two observers would simply change a portion of the vehicles by one class, and the error in the final result could hardly exceed five per cent.

"I have discarded the weight of the horses altogether, not because they do not constitute a factor in the wear of the pavement, but because they were discarded in the English reports, and I desired as far as possible to make comparisons with them. The addition that would have been made if the horses were included would vary with the

traffic. On streets where light vehicles predominate (as on Fifth Avenue), the addition to the tonnage by including the weight of the horses would be about 85 per cent.; on streets with heavy vehicles (such as Wabash Avenue, in Chicago), it would be only about 40 per cent.; and for other streets it would be between these two limits.

"The average daily traffic was obtained by dividing the total record for six days by six. To obtain the tonnage, I estimated the light-weight vehicles to average one-half ton each (including their loads), the medium weight two tons, and the heavy weight four tons.* Multiplying the daily average of vehicles in each class by these figures and adding together the products, the total tonnage was obtained; and dividing this by the width between curbs, we get the daily average tonnage per foot of width.

*According to the observation of the writer of this article, in five of these cities during the past summer, this estimate seems to assign too much tonnage in the "light weight" and "medium weight" vehicles.

"The average tonnage per vehicle is an almost infallible indicator of the character of the street, *i. e.*, whether devoted to residential or business purposes. It ranges from 0.68 tons on Fifth Avenue to 2.08 on a portion of Wabash Avenue in Chicago. The same character is indicated by the proportions of light and heavy vehicles on the street. On Fifth Avenue, for instance, 91 per cent. of all the vehicles weigh less than one ton, while on Wabash Avenue only 25 per cent. of them have so little weight. The general average for all the cities is as follows: Less than one ton, 67 per cent.; between one and three tons, 26 per cent.; more than three tons, 7 per cent. The average tonnage per foot in each city, so far as here observed, varies from 151 in New York to 30 in Buffalo, and the general average is 77. For all the cities in the table, the average daily tonnage per foot of width is 77, and varies from 273 tons on Broadway to 7 tons on a granite street in St. Louis. The average weight per vehicle is, for all cities, 1.15 tons. The average width of

the streets between curbs is 44 feet."

The only streets of Table VII, which were paved with wood at the time the observations were made were as follows: in Boston, Devonshire Street; in Chicago, La Salle; and in St. Louis, Chestnut. The others were paved with granite or asphalt. In this connection it is interesting to note that in London some of the heaviest traffic streets, *i. e.*, streets carrying 300 to 400 tons per foot of width, are paved with wood.

§ 21. In the preceding section it was shown that a daily traffic of 39 tons, exclusive of the effect of the horses' feet, wore 1 per cent. from a pavement laid with the brick designated No. 1 in all the preceding tables. The length of service was 39 months; the average weight of the load passing over the pavement was 1.13 tons (see § 15), as determined from the records of loads weighed. Notice that this is almost exactly the average weight of the vehicles observed by Captain Greene.

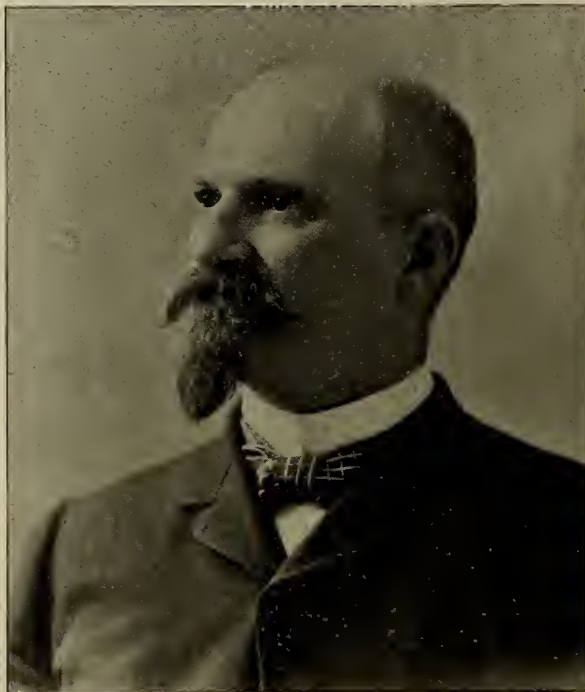
If a daily traffic of 39 tons wore off 1 per cent. then a pavement laid with the brick designated in the preceding tables as No. 1 and subject to a traffic of 39 tons per foot of width would nominally last 100 years, and a pavement subjected to twice that traffic would last half as long, and similarly for traffic of any other intensity. In this way were computed the quantities in the column numbered 1 of Table VII. Brick No. 3 lost in the rattler during the third half hour 3.2 times as much as No. 1, and if we assume that the relative durability in the pavement is the same as in the rattler, then the life of brick No. 3 can be found by dividing the quantity in column numbered 1 (the seventh column) of Table VII by 3.2. In this way was computed column 3 of Table VII, and similarly for the remaining columns.

Of course bricks could not be used in a pavement until they had lost 100 per cent. In one case the writer knows of brick which were originally 2x4x8 inches set on edge that have been worn down half their depth and still give no indication of difficulty in keeping them in place. Therefore it appears that the pavement will last at least until 50 per cent. of the depth of the upper course has been worn off, and there are some intelligent men who believe that a

brick will keep its place in a pavement until it is three fourths worn out.

Notice that if Captain Greene's estimates for the tonnage of "light-weight" and "medium-weight" vehicles are too great, as referred to above, then the quantities in columns 1-15 of Table VII are proportionally too small.

Table VII was extended to the full limit of all the valuable data, to afford the readers of this article a better opportunity for making comparisons. For example, a man who is personally familiar with the traffic of Broadway, New York City, by inspecting the top line of this table can form an opinion as to the durability of brick on that thoroughfare. Or a man who is person-



JOHN M. BLAIR, PRES. J. M. BLAIR BRICK CO., CINCINNATI, O.

ally acquainted with the wearing power of brick No. 10, or who manufactures a brick which gives the same results in the laboratory tests as No. 10, can judge of the durability of that brick under traffic of various intensity, by inspecting column 10 of the table.

Of course the table is not infallible, but is intended only as a rough approximation. In fact all of the preceding discussion is offered as indicating a method by which the durability of brick paving may be investigated, rather than as affording definite conclusions. It is greatly to be desired that some firm or association or municipality shall undertake a thorough investigation of the durability and economy of brick as a

as a paving material. Unquestionably bricks possess many characteristics which commend them for paving purposes. 1. They make a practically noiseless pavement. 2. They fit so close that there are no inter-spaces to retain filth and breed disease. 3. A brick pavement is easily cleaned. 4. A brick pavement is easily repaired. 5. The bricks can be made of any size and shape for gutters, slopes, etc., without much, if any, additional cost. 6. Brick pavements are so smooth as to reduce the tractive power, and wear and tear on vehicles almost to a minimum. 7. Bricks do not polish under wear, and hence always afford a good foot-hold to horses. 8. Good paving brick are not effected appreciably by moisture, frost, or fire. 9. The first cost of a brick pavement is less, at least in many localities, than any fairly durable pavement. Therefore, on the score of health and comfort, and first cost, brick pavements have much to commend them. The only debatable question is that of economy.

The economy of a pavement depends upon its first cost and upon the cost of maintenance. The first cost is an item that can readily be determined, in any particular case, with reasonable accuracy. But the first cost of a pavement is only one of the factors which determine its cost in a number of years. To determine this it is necessary to take account of the cost of maintenance and the interest on the first cost. It is said that in the twenty cities of this country which have a population of over 100,000 each, the pavements represent an investment of \$250,000,000—a trifle over \$40 per capita for the inhabitants of those cities. If the money value of the pavements of the other cities were added to the above value, the total would indeed be a large sum. Furthermore, there are many cities that at present are deterred from laying pavements owing to the great expense and unsatisfactory conditions of pavements in the past. All of this shows how important it is that pavements should fulfill, thoroughly and yet economically, the purposes for which they are designed.

The cost of maintenance depends upon the amount of traffic, the quality of the material, and the method of laying it. The last is the least impor-

tant, but it is the one that has received the most attention. Whatever the kind of pavement, the volume of the traffic is a necessary element in determining the cost of maintenance. Unfortunately there are but few data on this subject, and what little there are, were taken according to such diverse systems as to rob them of much of the value that they might otherwise have. It is very desirable that those having charge of pavements should determine the amount, kind, etc., of traffic passing over them. Such a data would be of very great value in determining the cost of maintenance.

We already have a fairly good knowledge of many of the materials employed for paving, and are reasonably well versed in the method of testing them; but brick is a material only comparatively recently employed for paving purposes, at least in this country, and at present there is no standard by which to judge of its quality. One of the objects of this article has been to present some data bearing on this point; and if such data shall be useful or interesting to any one, or if this article shall stimulate others to make further investigations, it will not have been written in vain.

(TO BE CONTINUED.)

Written for the Clay-Worker.

HINTS ON BRICKMAKING.

No. 56.

BY R. BRICK.

BRICK MACHINES AND THEIR DAILY CAPACITY.

SOME inventors have labored long and faithfully to perfect a brick machine that would turn out a vast quantity of bricks in ten hours, some trying to reach one hundred thousand per day.

Beginning with ten thousand per day, machines have been increased in strength and power until twenty, thirty, fifty, and, even sixty thousand, or more, bricks are made on a single machine in ten hours, and still there seems to be a desire on the part of some inventors to make machines of still greater capacity. The question arises, Which of these are the most economical to the manufacturers? In other words, is it better to make sixty thousand bricks per day on one machine than to make thirty thousand and a piece with two machines, assum-

ing that there is no difference in quality?

One argument in favor of the smaller machine is the first cost. If a machine of sixty thousand daily capacity costs three thousand dollars, and the smaller machines making an equal amount cost twelve hundred dollars, the saving in first cost is one thousand eight hundred dollars. From this it would appear that increasing capacity of a machine does not cheapen the cost of manufacturing the machine. The increased cost is much greater than the increase in production.

Again, with one machine the bricks are delivered at one place, while two machines can be made to deliver brick

regular output, still remain as items of economy.

These statements do not conflict with the interests of any particular machine manufacturer, for the reason that all the manufacturers that make machines of large capacity also make others of less capacity. It is a matter of "pay your money and take your choice" with the purchaser.

Many brick manufacturers rate the value of a brick machine by the amount of brick it will make in a day, and do not stop to figure the cost! If one brick machine of 60,000 bricks capacity could be sold for the same or a less sum than two machines of 30,000 capacity, then another argument in favor of the latter would fall. But so far the cost of the large machines is altogether out of proportion to the increased capacity of them. Whether the relative cost of manufacturing the large machines is greater or whether the manufacturer makes a profit in proportion to the size of the machine, are questions for the manufacturers of machines to answer. The writer is merely dealing with facts and conditions as they exist, and a majority of brickmakers prefer to pay twelve hundred dollars for two machines to paying three thousand or more for one machine.

Brick manufacturers should carefully consider all the points and advantages and disadvantages of the different machines for making brick and preparing clay. It does not always follow that the highest priced machines are the best and most economical, any more than that the lowest priced is the cheapest in the end. Buy

the machine that suits your clay one that will make a brick that will please your customers, and the one that will do this and in the end earn you the largest profits, is the machine for you to buy. The purchaser, after all, is the best equipped to make the choice, as he understands all the conditions that exist in his particular locality.

There is nothing says *Printers' Ink*, which succeeds like success; and the success of any publication which admits advertising is also the success of its advertisers. No argument is necessary to convince our patrons of the truth of this statement. They know by actual experience that our success is their success.



E. M. PIKE, TILE MANUFACTURER, CHENOA, ILL.

at two places, where they are more convenient to the drying yards. Then, if you have but one large machine and a break occurs, production is entirely shut off. With two machines one can still go on, and save a part of the product.

These are points for the purchaser to consider in making his decision between machines of large capacity and those of medium capacity. Where artificial dryers are used and large quantities of bricks are dried in comparatively small space, the delivery at two points instead of one loses part of its importance, but the difference in first cost of one large and two small machines, and the breaking of one machine shutting off but half the

BRICKYARD SKETCHES.

DAYTON, OHIO.



RECENT visit to this beautiful city afforded us an opportunity to view the machine shops of C. W. Raymond & Co., a firm name very familiar to our readers, for they produce such a variety of brickyard appliances that by whatever process one may make brick, he is sure to need something from their factory. Their chief product though is repress machinery, of which Mr. Raymond has made a special study. His inventive genius has enabled him to produce a line of these machines that has gained for him world wide fame. We were shown the latest and most improved device in this field—the Columbian—which is fully described and handsomely illustrated on another page. It is a splendid specimen of mechanical work, and from its appearance and movement, we think will eclipse Mr. Raymond's former productions. It is automatic in both the feeding and delivery of the product, which it turns out in splendid condition and with a rapidity and ease that is astonishing. It is particularly adapted to heavy work, such as paving blocks, and its great capacity makes it especially valuable to this growing branch of brickmaking.

The Columbian will surely fill a long felt want and bring honors and dollars to friend "Charlie." Thanks to Mr. Raymond we were enabled to visit the

NEW BRICK WORKS

of J. W. Boren, which is a well equipped soft clay plant. The clay bank is shallow and of ordinary character. The clay is shoveled into automatic dump cars and hauled to the foot of an incline where a wire cable is attached, and it is quickly taken up to the platform above a pug mill. The hoist is operated by a lever worked by the man at the pug mill. By an ingenious device the car stops the hoist when it arrives at the proper place, dumps its load and readjusting itself returns down the incline automatically, like a thing of life and reason. The work is positive and leaves

no more chance for accidents or failure than if operated by hand in the usual manner. This is another of Mr. Raymond's inventions; the entire equipment was erected under his supervision and is an interesting exhibit of the mechanical progress being made in this aged industry. From the pug mill the clay goes into a Penfield stock brick machine, which makes 20,000 a day. The brick are delivered on wood pallets on a revolving dumping table, piled on cars and placed in a ten tunnel dryer, 100 feet long, heated by exhaust steam. They first tried to heat the tunnels by direct heat from furnaces, but the brick cracked so badly they had to give it up. They then put in steam pipes, with a blower, furnished by the Akron Heating and Ventilating Co., and are now drying the brick very satisfactorily.

AT TOLEDO, OHIO.

We were fortunate in finding our good friend E. B. Hall at home, and was glad to accept a cordial invitation to drive with him to his yards. Mr. Hall's silver crowned poll will be kindly remembered by the older members of the N. B. M. A., in which organization he has always



OFFICE OF FINDLAY HYDRAULIC PRESS BRICK CO., TOLEDO, OHIO.

taken an active interest. He was unable to attend the last annual gathering but promises to be "with us" again at the next yearly meeting at Washington. He has grown gray in the brick business, having started one of the two yards he is now operating in 1860. His clay bank is an exceptionally fine one and will last for several years yet. It is yellow and tenacious, being ten feet or more in depth. At the top there are several inches of good molding sand, a foot or

two of yellow clay and the balance is blue. When he abandoned the old soak pit system he encountered considerable difficulty in working clay direct from bank, especially in dry weather, owing to its hard, lumpy character. This is now easily obviated by a peculiar method of managing it. The bank, which is about 300 feet in length, is divided into six or eight sections, one section being worked each day. A small trench is dug out at the bottom from the face of the bank back into it, a ditch a few inches deep is then made on the top of bank four feet or more from the edge, extending the length of the section. This is filled with water and in a few hours the mass caves off, when water is thrown over it from a hose and it is left exposed to the action of the atmosphere a week or more when it is easily worked. It is carted to a platform beneath which is a differential speed roller crusher. Before dumping a load of clay the opening in floor of platform is covered by loose boards laid across it and the entire load, almost, is thus deposited immediately over the crushers. The boards are then removed one at a time, allowing the clays to drop down into the

crusher as rapidly as it is wanted. In this way one man easily does the work that ordinarily requires two and there is no clogging or choking. A canvas elevator conveys the clay to a Martin machine, on which they make 30,000 a day. The brick are dried by rack and pallet system and burned in common clamps with, that best of all fuels, natural gas, which costs 80

cents per thousand brick made, including fuel for power, etc.

There is an air of order and tidiness about the plants that is praiseworthy.

The brick market has been very fair here this season, the price ranging about \$6.00.

We are indebted to Mr. Hall for a pleasant drive

OVER THE RIVER

to the works of the Findlay Hydraulic Press Brick Co., where we found a con-

genial spirit in Mr. G. W. Hart, the superintendent. This plant derives its name from the works owned by the same Company at Findlay, Ohio. They make common brick only, here, running three Martin machines, the clay first passing through upright pug mills very much resembling the ordinary soft clay machines in appearance, dry in racks and burn with natural gas in permanent kilns with massive walls. They watersmoke four days and finish in five to eight more. The kilns are completely enclosed by frame structure, thus preventing any danger from explosions resulting from the gas being blown out by the wind. There is an appearance of solidity about the plant that is pleasing. The posts supporting the kiln roofs are timbers 32 feet in length being planted six feet in the ground.

This Company has also set their neighbors a good example by building a very cosy office building which we kodaked for the benefit of our readers, many of whom should go and do likewise instead of occupying sheds and shanties, of which section hands would not be proud. Dress up, gentlemen, and don't be afraid of appearing respectable. Your neighbors will think none the less of you. Indeed we are inclined to think they will more cheerfully pay a better price for your products if you take on the appearance of a manufacturer rather than that of a day laborer.

IN AND ABOUT DETROIT.

One of the largest and oldest yards in Michigan's chief city is R. H. Hall's west side plant. This we found in charge of Mr. Chas. Frank, who is evidently the right man in the right place. There are four soft clay machines which are worked alternately—two in the forenoon and two in the afternoon. The clay is taken from soak pits, there being two for each machine, which are 23 feet long—a trough conveyor runs between them. From the machine the brick are carried in the molds and dumped on the yard, and after drying a few hours are piled in rows. A large part of this work is done by women and children. Here we saw a veritable bickyard kinder. The paternal was at work about the kiln. The mother was piling the brick, two little girls were "edging" while one still

smaller was amusing the youngest offspring by pushing him about in a baby carriage. From the "old man" to the "kid" all were industrious and happy.

The brick are burned in common clamps with crude oil, which costs 45 cents a barrel—watersmoke 48 hours and finish in five days, setting 46 high. The oil is taken direct from the tank car which is run on track at side of kiln.



We visited several other west side yards and found them making in the same manner with one exception—the Detroit Press Brick Co. This Company is making some front brick by the dry press process and have permanent kilns and a steam dryer.

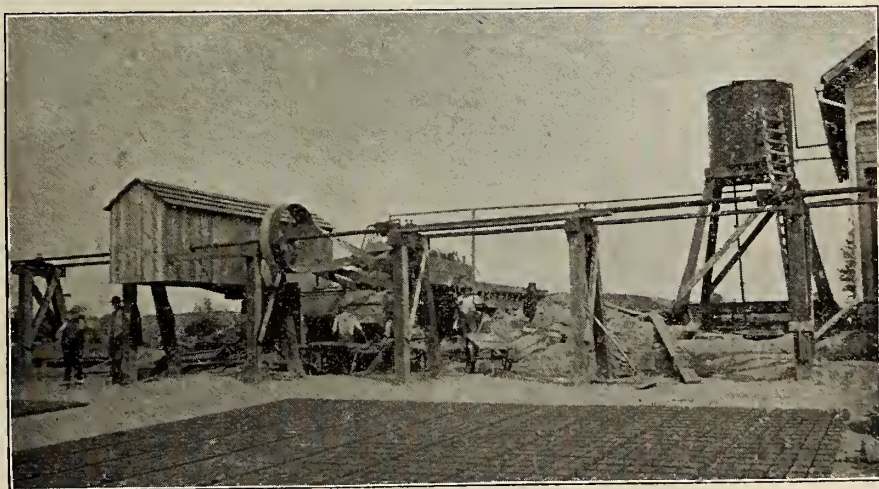
AKRON, OHIO,

Is a handsome city of thirty thousand people. It is noted as one of the greatest clay manufacturing centers in the United States. There are extensive potteries, sewer pipe, fire clay and tile

in 1871. They now make two million brick a year by the soft clay process, using "Quaker" machines, dry on an open yard 160x360 feet, and burn in square kilns, with permanent walls, with coal; set 40 high and burn about 14 days. Early in the present season they put in a "Monarch" machine, which is a new all iron machine made by the Wellington (Ohio) Machine Co., who, as our readers know, are the inventors and manufacturers of the "Quaker." The "Monarch" is the "Quaker" evolved, and is a very radical departure from the old style soft clay machine. It has demonstrated great strength and capacity. Messrs. McCausland Bros. are very much pleased with it and think it is well nigh perfect and that its construction is such that, like the one horse chaise, it will last a hundred years and a day.

WHERE DOES THE WATER COME FROM.

One of the most peculiar features of the plant is the water supply. The plant is located on the summit of one of the many great hills among which Akron is built. The first year clay was taken from, seemingly, the highest point on the hill. Subsequently clay was taken from another spot, and the basin-like hole first formed filled with water and has never gone dry since. It furnishes an abundant supply for all purposes about the works though the



factories here almost without end, any of which would well repay a visit, but our time was limited, so we confined our "sketches" to the brick works of McCausland Bros., where we enjoyed the novel sight of seeing a brick manufacturer living in a brick house. Brickmakers usually live in frame buildings, while brick manufacturers dwell in brown stone fronts. The plant was established

demand in dry seasons like the one just past is quite heavy.

CUYAHOGA FALLS, OHIO.

Is a pretty hamlet in one of the most picturesque spots in the great "Buckeye" State. It is known to our readers as the home of Messrs. Turner, Vaughn & Taylor, manufacturers of clayworking machinery, whose factory is perched on the

very verge of a deep chasm at the bottom of which runs a boisterous little stream, which, as it meanders along, breaks forth every now and then in frothy cascades, as if, tired of restraint, it is vainly trying to escape from its narrow confines. Amateur photographers will find many charming subjects upon which to try their skill, while lovers of picturesque scenery should camp here for a season.

Across the stream from Messrs. Turner, Vaughn & Taylor's works is the factory of Camp & Thompson, manufacturers of sewer pipe, hollow building blocks, and roofing and drain tile. Their works are extensive and would well repay a visit, but lack of time prevented our doing more than glancing about at the various buildings, kilns, stock sheds, and great piles of ware which cover several acres.

Mr. Camp has devoted many years of study and experiment to clay work and his experiences if committed to writing would make a very large and interesting volume. He is of an inventive turn and has produced many devices of utility in the various departments and processes; among them a novel brick machine working upon an entirely different plan from any now in use and having a very large capacity. He is now preparing to manufacture it for the trade, generally. He is a believer in the use of hollow brick for building purposes and has constructed several buildings of hollow blocks 16½ inches long, 8½ inches square, that, to our eyes, are very attractive. A cut of a neat little cottage built of these blocks will be given in a subsequent issue of the CLAY-WORKER.

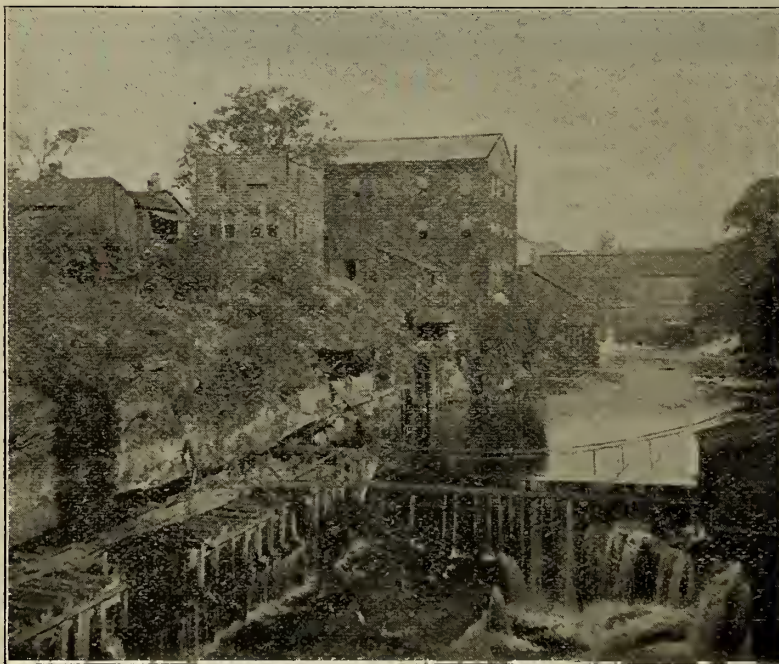
What is meant by judicious advertising is to tell the story you have to tell to the largest number of the right sort of people in the way best calculated to produce the effect you desire to produce and at the smallest cost. First of all, it is necessary to secure a well-worded advertisement, effectively displayed—yet with many advertisers this is the last point considered.—*Printer's Ink.*

Written for the Clay-Worker.

BRICK AS A BUILDING MATERIAL. AND THE TRUE ART OF LAYING THEM.

BY J. W. CRARY, SR.

IT would seem, that after 4000 years of experience in the use of brick, as a building material, that little or nothing could be said, either for or against the use of brick, as an indispensable material in the construction of the best, and most durable buildings. Yet the majority of persons in the United States, would use wood for building, if the laws would permit it. This is owing to the fact, that the average American citizen, is taught from early boyhood, that he must make the most of his *means*. He



TURNER, VAUGHN & TAYLOR'S WORKS, CUYAHOGA FALLS, OHIO.

studies for *quantity*, not for *quality*. If he has \$1,000 to invest in building a house, and is permitted to build it of lumber, he knows that he can build one-third cheaper with lumber than with brick, and that the wooden house will rent for as much as the brick house. His calculations are all based on present cost and profit. If you tell him that the risk of insurance will cost him twice more for a wooden, than for a brick house, he will reply that he can afford it, because his wooden house costs one-third less than if built of brick, and by way of *blowing* for popular ignorance and prejudice, will say, that "people prefer to rent, and live in wooden houses, because they are more dry and healthy, than brick houses." If you tell

such a person, that the difference of insurance in ten years, paid for risk on the house, and on the goods that may be in the house, over and above the cost of insurance that would be paid if the house were built of brick, would amount to the difference between the cost of building with wood and brick, he will say, "well, all that may be true, but I don't bother my head with insurance, and as for ten years hence, I may be dead. I am looking out for the present, let the future take care of itself." I grant that this man blunders on a Christian idea Math. VI. 34, "Take therefore, no thought for the morrow." But if he thought of this, he misapplied it, for Christ referred to providential things, not to human, for he says in the same sermon: "The wise man built his house on a rock," and I doubt not, that he meant a brick house was the best, and only proper house to build on a rock.

BRICK CONNECTED WITH POLITICAL ECONOMY.

I have shown in a series of articles in the CLAY-WORKER, ending in September No. of 1891, that at least fifty millions dollars annually would be saved to the general public in the United States if brick were used exclusively for building purposes, but I did not refer to the life and health question involved in the use of brick. This would be an unknowable quantity, but it would be great,

which neither philanthropist nor economist will deny.

If a town or city be built of fire proof materials, and the buildings are constructed in a proper way, it is impossible to have a disastrous fire in such town, but if such towns be built of timber, and the ordinary combustible materials, not only the property, but lives of the people, are in great peril. Thousands of people were burned to death, in cities on fire, before laws for fire proof buildings were enacted.

PAVING STREETS WITH BRICK, A GREAT SANITARY IMPROVEMENT.

The experiment of brick pavements for streets, has been so successful that the question is no longer problematical, and the entire medical authority, and

boards of health, have approved of brick pavements for streets.

A street paved with brick in the proper way, can be kept clean, and clear of all cause of disease. So that with suitable and effective care and drainage, the whole city may be renovated in health at proper times, and kept as clean and tidy as a perfect model dwelling, and thereby all causes of epidemical diseases be completely removed and excluded. If we take then the whole gain in the general and exclusive use of brick as a building material, as respects *insurance, fire, and health*, say nothing of permanent profit and increase of values. We find that the balance in favor of brick, as a building material, is so great that the fact is beyond all sensible controversy. NOW WE WILL CONSIDER THE RIGHT WAY

TO USE AND LAY BRICK.

As I have said in previous articles, neither the average Civil Engineer, Architect, Builder or Bricklayer, can fairly claim a thorough, correct, and proper knowledge of brick, mortar, and the true and best use of them. There are some real true experts in the *lines* of business above mentioned, but they are scarce, and their proficiency and merits are not properly appreciated. The common pated Civil Engineer or Architect have read and perhaps studied some school text books on their business; they have been some time in the office of some leading man who is well known as C. E., or Architect, and have had some experience in making plans and drawing specifications, etc., etc., but they never tested a brick or barrel of lime or sand; they never knew anything about mortar or cement by actual personal observation and practice, but they have got it down *fine*, and technical in their specifications, and when the successful bidder for a job of work under their charge, comes around to the office to get their plans and specifications, and sees the great display of technical learning, he is profoundly impressed with the great proficiency of his superior and supervisor. The brick are to be "whole, hard, well burned brick." "The lime is to be the best fresh, unslacked lime." "The sand to be best, clean sharp sand," and so on, all in the superlative degree, every kind of material and workmanship "must be of the best kind and done in the best manner."

Now let us notice a few of the vagaries

in this stereotyped addition of a common building operation.

"Whole hard well burned brick," means that such brick as can be procured in the place where the work is to be done. The clay may be inferior, of which brick are made in that locality, or, the manufacture may be inferior, and the burning may be imperfect, which in most cases is the plain fact. If brick are made of good clay and a kiln of such brick is burned "*hard*" in the true proper sense of the word, the hard brick will all be uniform in color and strength. All brick are hard if burned at all, but as the word "*hard*" in a technical sense, as used by brickmakers, means a perfect uniform hardness and color. It is misleading and deceptive to call all brick hard that are not "*salmon*." ("*Salmon*," is a technical word as used by brickmakers. Its derivation is uncertain, but it is supposed to be taken from the peculiar color of the salmon fish, which is a uniform yellowish red.)

NO COLOR CAN DESIGNATE THE QUALITY OF A BRICK.

Clays differ in their proportions of mineral oxides and these give color to brick, according to the heat and air to which they are subjected. But the largest proportion of clay from which brick are made, being more or less colored with sesqui—or proxide of iron. Most all brick in our markets are more or less red in color. If the Architect would say in his specification, "The brick must be of pure clay, (silicate of allumina,) free from any matter that would make the brick pliable or liable to decomposition by the action of the weather, and thoroughly burned and indurated according to samples in my office." (It would not be necessary to specify resistance to crushing forces for if brick be made of any pure good clay and burned thoroughly hard and then headed in good mortar they will stand a pressure far greater than any possible structure would require.) Then make contractors comply strictly with the specification, and we would have a new era in building greatly beneficial to the general public.

MANY OF OUR FINE LOOKING BUILDINGS ARE TRAPS.

We use a French *condiment* to secure our architectural shams, and call it "*renaissant*," (pronounced re-sie-san). It means that our architects and builders are reviving and reproducing the best

and most famous styles of the ancient lost art of building. So far it seems that the *ornate* part of the *renaissant* is about the extent of its progress, especially as regards brickwork. We hear of the great demand for a variety of colors in brick, no matter how ill shaped and rough, so that an old fashion, country, batch brickmaker could just now fill the bill for a first class "*renaissant front*." His black fused, crooked, shapeless arch brick; his vitrified *pavers*, his half burned red and his pumpkin colored salmon would drive out the best red pressed, straw, buff, or cream colored brick in the market; all of which the architect could get to make variety in front work, but he is on a "*still hunt*" for the odd, the race, the none-such he sees pays, and prominence in absurdity, and the more grotesque the better for "*pocket and puff*." The foundations, the proper proportions for strength and the true way of constructing walls are things often ignored, and the safety and interest of the public sacrificed, in order to produce outside show and rival competition.

In my next article I will speak of mortar, cement, and the right way to use it; also, of bricklaying, and right proportions for strength in brick walls and how bearings, girders, etc., should be put up and secured.

NEW INVENTIONS.

The following is a list of patents appertaining to brick, tile, terra-cotta, sewer pipe, pottery, etc., and the machinery used in their manufacture, issued since our last number.

- 455,926. Drain Pipe—Henry E. Ogden, Newark, N. J.
- 455,951. Brick Mold and Press—Chas. W. Raymond, Dayton, Ohio.
- 456,449. Brick and Tile Cutting Machine—John Thompson, Bucyrus, O.
- 457,381. Brick Machine—Frederick L. Sims, Toronto, Canada.
- 457,465. Pottery Kiln—John McCloskie, Massillon, Ohio.
- 457,924. Tile Press—Louis W. Nuebling, Indianapolis, Ind.
- 457,982. Brick—Rudolph Bohme, Berlin, Germany.
- 459,153. Brick Machine—Paul Foss, Chicago, Ills.
- 459,313. Brick Mould—Chas. E. Simpson, Portsmouth, Ohio.
- 459,642. Brick Machine—Albert F. Miller, Pittsburgh, Kans.
- 456,719. Brick or Tile Cutting Machine—Wm. R. Cunningham, Frankfort, Ind.
- 459,878. Brick Machine—Henry Aiken, Homestead, Pa.
- 460,352. Drain Tile—Wm. Reading, Rockville, Md.
- 466,637. Brick Kiln—Wm. L. Gregg, Philadelphia, Pa.

A NEW PAVING BRICK PRESS "THE COLUMBIAN."

A DECIDED stand has recently been taken by Engineers and Municipal Boards in favor of a more durable and uniform street paving brick, one that will stand the numerous tests of abrasion, absorption, etc., to which modern science subjects them, and that will more readily compete with Granite in density and Asphalt in smoothness of surface.

Realizing the great value of a vitrified brick possessing these qualifications, a large proportion of the cities that have lately paved their streets, or, invited bids therefor, have specified re-pressed brick.

To produce a press with capacity sufficiently large to justify the user to re-press their products at a nominal cost, and at the same time subject each brick to an immense pressure, has been the aim of the manufacturers of the "Columbian" herewith shown.

STRICTLY HIGH GRADE—THE
"CONCERT GRAND" OF ALL
PRESSES.

"The Columbian," is a massive and powerful piece of mechanism of high grade, built for the requirements of manufacturers of street and other paving brick.

Strong, with powerful pressure. Large capacity and ease of operation are fitting characteristics.

MASSIVE IN CONSTRUCTION,
PONDEROUS IN PRESSURE.

Its weight is nearly 4,000 pounds. Estimated pressure, 30,000 pounds. Capacity, 12 to 14,000 paving bricks or blocks per day.

It is fitted for both steam and oil lubrication.

EXPERT LABOR NOT REQUIRED TO RUN IT.

Great care has been taken in its construction to use few and simple mechanical movements, that it can be easily understood and operated by unskilled labor, and that repairs may be reduced to a minimum.

A REGULAR PRESSURE ALIKE ON BOTH
SIDES OF THE BRICK.

It gives a regular and steady pressure to each brick, and will compress more

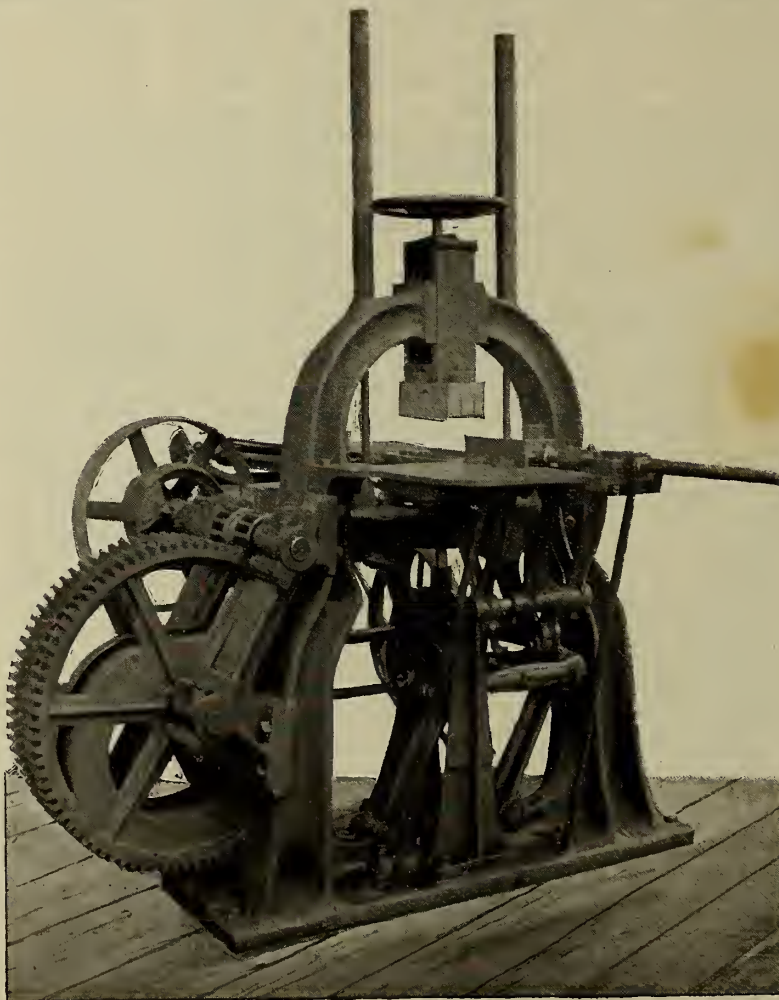
clay or plastic material into a given space than any press of its class upon the market.

ALL BRICK MADE OF UNIFORM THICKNESS.

The pressure is applied uniformly; the joints always coming to a fixed point, hence any deviation in the thickness of the brick is impossible.

ALMOST UNLIMITED CAPACITY.

It can be operated at a most astonishing speed, doing equally as good work fast as slow. At various trials for speed, it was shown that the efficiency of the operator alone limited its capacity.



"THE COLUMBIAN" BRICK PRESS.

A UNIVERSAL PRESS—NOT BUILT FOR ONE
SIZE DIE ALONE.

Another feature of note, varied sized dies can be used upon it. The die, as in other presses, does not form an integral part of the press, but is a distinct and separate feature, hence can be easily removed and another substituted. Red brick, fire brick, paving blocks, key, wedge, arch, in fact nearly all sizes and shaped brick can be worked upon it, thus making it practically universal in its application.

NOMINAL POWER REQUIRED TO OPERATE IT.

The amount of power required to operate it is nominal, not over one-half horse-power. Bricks can be pressed easily by turning the driving pulley by hand.

WE GIVE IT OUR UNQUALIFIED INDORSEMENT.

We commend this press to the trade, as filling all the requirements of a successful and economical paving brick press.

It is needless to say "The Columbian" is the product of Messrs. C. W. Raymond & Co., of Dayton, Ohio.

OUR PICTURE GALLERY

We are proud of the pictures of leading brick-makers that appear from time to time in the CLAY-WORKER. First, because we are responsible for that part—we are proud of the mechanical execution of them. They are not the cruel caricatures which appear in the daily press and which must be an unendurable affliction upon the unfortunate victims. We challenge criticisms upon the mechanical work on our picture gallery. But we take no less pride, though of a different kind, in the good looks of the men represented. They are our associates in the work of building up the art of clayworking, and we are proud to be associated with men of such culture and of such fine physiques as their portraits show them to be. There are no dyspeptics among brickmakers. Their proverbial honesty and high

morality are conducive to that quietude of conscience which insures good digestion and the nature of their physical exercise does the balance. They are all good looking men.

Dayton, Ohio, is putting down several miles of vitrified paving bricks. Their contracts were awarded to the manufacturers of the Hallwood Block, the John Porter Brick and the Townsend Zanesville Brick. Their specifications called for re-pressed brick exclusively.

VITRIFIED STREET PAVING AND DRY PRESS BRICKMAKING IN NEW ENGLAND.

BY J. A. SNELL.

THE dry press brick was born and has flourished in the middle west for a number of years, and has been cordially invited to beautify cities as far west as the Pacific coast, but farther east than the western boundary of New York and Pennsylvania state lines it has been a rare and generally unwelcome visitor.

If you ask a western brickmaker why he thinks this fact to be the case he will undoubtedly answer, "Oh, prejudice," and in the main he will be right. Whether that prejudice will ever be overcome, and their manufacture become a general success in the East, is a question probably often asked by Eastern as well as Western brickmakers, and, it is a question, the answering of which, to a certain extent, is not far distant.

Extensive works within a very short time have been erected in Washington City, and also at points in New Jersey, and even in Canada. Undoubtedly the farthest east of all and the very latest to embark in the venture, is the New England Steam Brick Co., of Barrington, R. I. Will they and their contemporaries have success? To this question there is an answer which time will prove to be correct, and it is YES, if from the beginning they make a genuinely good press brick, and as emphatically NO, if they make a poor one.

Often, the writer, while living in the West, has heard it stated that a good dry press brick could not be made in the East, because the clay was not adapted to the process.

With the majority of Eastern clays this is possibly true, but there are many exceptions, as may be learned by a visit to the Barrington yard, for there you will find dry press brick being made which are of good texture, ring and finish, and a beautiful dark cherry red in color. Probably no man, however, who was acquainted with the kind of clay required to make a good dry press brick would, upon a superficial observation of the Barrington clay, ever recommend it for any brickmaking purpose.

The general make-up of the clay bed is one to strike terror to the man who contemplates operating it, and the troubles arising to him when so doing, can no more be made to stay down than the famous Ghost of Bancho.

Imagine a swamp on a level with the

Atlantic tides, which is so thickly overgrown with trees, bushes and vines, as to be almost impenetrable. With rubber hip boots it is navigable in places during midsummer, and if you find yourself taking the direct route to China you can hook some of the many briars, vines, into your clothes, and literally lift yourself up by the seat of your pants. To get a sight of the clay, you must not only remove the heavy wood and vegetable growth, but also an average depth of two feet of one tangled mass of roots and wet muck. Below this lies a light colored sand (which burns a dark red) in depth from one to four feet, and this sand levels off hillocks of clay, and making the whole topography of the bed about the same as if you took a very mountainous section of country, and the mountains being of clay, you leveled up the valleys above the highest peaks with sand. Below the sand clay, at a very uneven depth, of from six to sixteen feet, is found a sluggish quicksand, and where is also found a very good place to bury about a car-load of tools during the season, and if some of the lazy Italian laborers would only find their way into the quagmire as often as do their shovels, the result would sometimes be highly satisfactory to the company.

Now when one takes into consideration that of these little hillrocks or mountains of clay the first is of a blue color and almost shaley nature, and the second a yellow color and sandy composition, it will readily be understood what kind of a task it must be to harvest clay for a dry press machine from such a field.

It is, however, being done, and from ten to twenty thousand per day of fine press brick being made. These brick are set in those sections of Eudaly's down draft kilns, where they will burn the best and most uniform color, and above and around them those made on a stiff mud machine for paving purposes.

Were I reading this article in the Brick Manufacturers Convention, I should expect to hear a dozen voices exclaim, "What a good dry press brick and also a paving brick from the same clay!" Well, I confess, that last winter, if I had heard such a statement in the Convention, I might have believed it—after seeing the two kinds of brick—and yet the paving brick made by the Barrington people have just been tested by the city engineers of Boston, Providence and Pawtucket; the test being made in a

rattler, with granite blocks, pieces of cast iron and paving brick made by Purington and others of as high a standard; and in each test the pavers made by the Barrington yard suffered the smallest per centage of loss of abrasion, and absorbed between one and two per cent. of water.

As the cities of Boston and Providence have both completed the laying of a street with the Barrington vitrified brick since making the test, and the city of Pawtucket will do so as soon as they can be obtained, it will be seen that they must have proved of good quality.

Most of the brick pavements, so far, laid in the East, have, of course, been done as experimental work, and one interested in their manufacture might perhaps be inclined to think their use would become more quickly general than the present status of the case would warrant, but, nevertheless, the expressed opinion of city engineers, street commissioners and the press generally, tend to show that vitrified brick as a pavement is very favorably looked upon, even by the conservative "Down East Yankee."

Messrs. G. W. Smith, manager of the Wilburn Lumber Co., and J. H. Millard, of Oelwein, Ia., have purchased five acres of land adjoining the Burlington, Cedar Rapids and Northern Railroad on one side and Chicago, St. Paul, and Kansas City R. R., on the other. They have from 15 to 20 feet of fine brick clay, and intend putting in a plant in the spring. They expect a side track from each road running to their kilns, which will enable them to ship in four different directions.



AGAINST THE RULE.

First Hodgecarrier—"What did the Walkin' Diligante fine you for Mike?"

Second Ditto—"Fur comin' down th' ladder two rounds at a time."—Puck.

Written for the Clay-Worker.

THE FUEL QUESTION.

No. 12.

CONDUCTION OF HEAT.

DEAR WILL :—As promised in my last, I proceed to show you a property, not of heat itself, but of bodies that are found to conduct heat; some of them conduct it well, or quickly, others conduct it badly, or *slowly*, while again others conduct it at a medium rate. Good and bad conductors may be illustrated by a piece of copper wire, say about four inches long and a small spile of wood the same size; now take the wire and hold it in the flame of a lamp or gas burner, or, better still, in the flame of a spirit lamp, and the wire soon becomes too hot for the fingers, but with the wooden spile, or match, how different, it, of course, ignites, and you may hold it until it is burnt very close to the fingers without perceiving the wood getting any hotter; so, we say, in the case of the copper, it is a good conductor of heat, and, in the case of the wood, we call it a bad conductor. Conduction takes place, by heat being transmitted through bodies from particle to particle, or, as the scientist would say, from “molecule to molecule,” and may be to some extent illustrated by the childish amusement of placing a row of bricks on end two or three inches apart, then knocking down an end one so that it will fall against its neighbor, which, in turn, falls against the next and so on to the end of the row; “playing soldiers” was what we used to call it. Now heat is conducted through bodies much in the same manner as *momentum* is conducted through the row of bricks.

The study of this branch of *heat motion* has a wide field of interest apart from its bearing on the economy of fuel, but for the present we will confine ourselves to its relations in fuel economy, and to this end it is highly important that we should know which are good, and which are bad conductors of heat. Our forefathers in science have made careful experiments with different substances and have left us a record of the results they obtained; thus we have a list of good, bad, and medium conductors, not only this, but they have given us the ratio of their conducting powers.

NAME OF SUBSTANCE.	CONDUCTIVITY.	
	For Electricity.	For Heat.
Silver.....	100	100
Copper.....	73	74
Gold.....	59	53
Brass.....	22	24
Tin.....	23	15
Iron.....	13	12
Lead.....	11	9
Platinum.....	10	8
German Silver.....	6	6
Bismuth.....	2	2

The following table is from Prof. Tyndall's “Heat as a Mode of Motion,” and gives us the relative conductivity of eight metals and two alloys; the table

also gives the relative conductivity for electricity, which I copy because it exhibits an important connection between heat and electricity which the Professor points out and draws some very ingenious inferences therefrom.

Dense bodies are generally the best conductors, and light porous ones the worst. A rough estimate may be made of the conducting power of any material by simply feeling it. Woolen cloth feels warm, not because it really is so, but because it is a very poor conductor of heat away from the hand when feeling it, while a piece of copper or iron about the same temperature would feel very cold, because they would conduct the heat from the hand so rapidly. The sensation produced on the fingers by handling extremely cold iron, say 0° F. or below, is similar to that produced by a low black heat. Burning of the fingers is produced if they are held in contact with iron a little above 120° F. and the lips are blistered if held to the same iron cooled down to a little below 0° F.; in the first case the iron gives out its heat rapidly to the fingers and burns them, and in the second case the lips give up their heat so rapidly to the iron that they are—in effect—burnt also. If we substitute a piece of cloth or flannel for the iron, and use the same temperatures, no such effects are produced on the fingers and lips.

We wear in winter, suitable clothing to keep us warm, or in other words, to prevent the heat of our bodies radiating into space, or, to surrounding bodies much lower in temperature, and we purchase the worst conducting material our purses can afford for this clothing; many of us without knowing anything about radiation and conduction, or the escape of heat from our bodies choose that which keeps us warmest, viz., furs, this having a lower conductive power than any of our woven fabrics. It may not be out of place here, to give the conductivity of some of the materials used for clothing; their conducting power decreases with the order in which I name them—linen, cotton, silk, wool, furs; so with fabrics of equal texture the woolen goods are the warmest, or, more correctly, they are the worst conductors of heat, and will, consequently, best retain the heat of our bodies.

Having—as usual—made a digression, I will endeavor to use it as a metaphor in showing the important bearing of conduction on the economy of fuel.

As with the human body, so with all kilns and furnaces, where the object to be attained is the using up of all the heat *inside* such kilns or furnaces, the clothing, or walls, must be of non-conducting material and must be reasonably thick.

Man puts on for winter wear good, thick underwear, and, in addition to good, thick upperwear, he dons a substantial overcoat; this, practically prevents conduction and the radiation of his heat and lessens the consumption of his *fuel food*. I need scarcely tell you

the kiln and furnace for inside work, requires similar care and treatment, for they have one continuous winter while they are burning, that is, they have an outside temperature much below theirs inside, which is ever ready to devour all the heat that may escape from top or through the walls.

In kilns and furnaces for high temperatures it so happens that the most refractory materials available for building the walls of such kilns, etc., are also poor conductors of heat, but there are numerous cases where it is desirable to return all the heat and at the same time use moderately good conductors in building the heat retaining vessels; this is done to secure strength; steam boilers and steam pipes are cases in point, they are usually made of iron, which cannot be classed as a very good conductor, but good enough to conduct and radiate a great deal of heat to waste, unless proper measures be taken to prevent it; this is usually accomplished by coating the pipes and boiler with a non-conducting material. Boilers are sometimes covered with a coating of bricks, sometimes with asbestos and sometimes with a coating of air enclosed in a tight sheet iron casing. A good coating for steam pipes, especially small ones is made of coarse felt, in sheets, which may be wrapped round the pipes and secured by bands of light hoop-iron or wire.

The following is the formula for a composition for covering boilers and steam pipes which I saw tried and proved to be very satisfactory in the extensive iron and steel works of John Brown & Co., Limited, Sheffield, England. It is cheap and an ordinary laborer with a trowel can put it on. About 6 cents per square foot was the cost of materials and putting on in those works.

- 1 cart load of clay.
- 2 bushels cow hair.
- 1 bag chopped hay.

These are to be well mixed and moistened to the consistence of mortar, and then put on in rough layers and smoothed off to a finish when about 2½ inches thick; this is the thickness for boilers and large steam mains; of course a thinner coating will do for small pipes. This is such a perfect non-conductor that I could bear my cheek against the boilers so coated without feeling more than a pleasant warmth. Prof. Tyndall says a coating, or, “jacket of gypsum powder round a steam boiler would materially lessen its loss of heat” much better, he thinks, than sand, giving as his reason, that gypsum “in the solid crystalline state is incomparably a worse conductor than silica, and it may be safely inferred, that in the powdered state its imperviousness far transcends that of sand, each grain of which is a good conductor.” I think Prof. Tyndall's suggestion practical and good, and would be highly pleased if some of my “Dear Wills” of the CLAY-WORKER would try it and communicate their results to these columns. I have no hesitation in saying, such a communication would be

highly appreciated by the readers of the CLAY-WORKER in general.

Fuel is a large item in the cost of brick manufacturing, and is becoming more and more so every day; not only are bricks molded by steam, but they are also dried by steam, conveyors and steam shovels are also coming into vogue. Then as steam plays so important a part in the brickyard, etc., it behooves the manufacturer to generate it, and use it with the highest economy available. Let him not fall into the common error of generating economically and then suffering 25 per cent. of it to go to waste by radiation and conduction; he must remember that condensed steam, or simply hot water will not drive his engine; it may dry his bricks—after a fashion—but the ratio of drying power between steam at 212° and water at 212° is 5½ of the former to 1 of the latter; bear in mind what has been said about the *latent heat* of steam, refer again to my letter in CLAY-WORKER for July and read up the portion on latent heat again, do not skim over these letters satisfied with half developed ideas, make yourself sufficiently acquainted with the subjects treated of, so as to be able to conscientiously criticize them.

And now let me further illustrate the beneficial effect of protecting the *outside* of boilers and steam pipes with non-conducting coatings, by showing the wasteful and mischievous effect of such a coating *inside* the boiler.

Nearly all the feed water supplied to boilers deposits a sediment in the boiler; the water may be very sparkling and clear, and still hold in *solution* a considerable percentage of solid material, which is deposited in the boiler as the water evaporates, and by this process there is gradually formed inside the boiler the coating mentioned above; in addition to this matter that is held in solution, the water is sometimes muddy, or, as we say, "roily;" this is when solid matter is held in *suspension* by the water; this suspended matter also gets deposited in the boiler and assists in the formation of the coating alluded to, and sooner or later a coating accumulates that very seriously interferes with the generation of steam, and endangers the safety of such boiler by overheating the plates, and consequently weakening them; the heating of the plates proceeds in proportion to the thickness of the deposit on them, and the waste of fuel increases alarmingly with the thickness of this "scale," as it is called, "incrustation" is another of its names. According to Babcock & Wilcox work, "Steam," a thickness of scale only one-sixteenth inch will cause a loss of 13 per cent. of fuel, a thickness of one-quarter inch a loss of 38 per cent. and a thickness of one-half inch a loss of 60 per cent. These are serious losses of fuel, to say nothing of the danger to life and property from weakening of the plates by the overheating referred to above.

Roper, in his work "USE AND ABUSE OF THE STEAM BOILER," says: "To raise steam to a pressure of 90 pounds

the water must be heated to about 320° F. In a clean boiler of one-quarter inch iron, this may be done by heating the external surface of the shell to about 325°. If one-half an inch of scale intervenes between the shell and the water, such is its non-conducting power that it will be necessary to heat the fire surface to about 700°, almost low red heat. Now the higher the temperature at which iron is kept, the more rapidly it oxidizes, and, at any heat above 600° it very soon becomes granular and brittle, and is liable to bulge, crack, or otherwise give way to the internal pressure. This condition predisposes the boiler to explosions, and makes necessary expensive repairs."

Now place the two cases side by side, and in the last case you plainly perceive the mischief and waste arising from a coating of non-conducting material *inside* the boiler, if only one-half inch in thickness; and you must as plainly see the necessity of an *outer* covering of this same, or similar non-conducting material.

Now let me impress on you the importance and money value of scientific knowledge in the commonest everyday affairs of life, but more especially so, in the manufacturing industries, where fuel and other costly materials are used up in large quantities; the proper uses of these materials are not altogether dependent on brawn and muscle. The little that has been already advanced ought to convince you of the importance of conduction and radiation, and how they effect the economy and the waste of fuel, and you will observe also that this is entirely independent of good or bad stoking, in fact, *the management of the fires may be practically perfect, and, still, more than 50 per cent. of the fuel be wasted;* for with this perfection in stoking, the candle may be veritably "burning at both ends," by excessive scaling inside the boiler, and no covering outside it.

I have not touched on convection in this letter, nor finished on conduction, as I have another case or two which are of too much consequence to be left out; these will take up the question drying and heating by steam and the important roles played by conduction and radiation in these processes.

Yours Paternally,

HYDRO-CARBON.

AN IMPORTANT ADJUNCT.

It pays to use crushers of some kind in connection with the machine, to prepare the clay for machine, by breaking up hard pieces of clay, enabling the machine to make a much better brick with less power, also a greater quantity per day. In addition a crusher is a complete protection to the machine, as it arrests all objects that are not intended to go into a machine, and were never designed by the Creator to make bricks of such as rocks, railroad spikes, iron bolts, horse shoes, etc. The saving in repairs of machine will, in some clays, pay for crusher in six months, to say nothing of increase in quantity and improvement in quality

of the bricks. It is not the highest priced crusher that is most effective. They cost from \$250 to \$1,000 each, and the cheaper machines often give better results than the others.—R. Brick.

WANTED---A REDUCED RATE FOR THE BRICK MANUFACTURERS' ASSOCIATION MEETING.

The next annual meeting of the National Brick Manufacturers' Association in Washington in January next is several months off, it is true, but it is never too early to begin preparations for a journey, especially in making the transportation arrangements. We have found that the BALTIMORE AND OHIO furnishes information more promptly and more satisfactorily than any of the grand trunk lines, and is most liberally disposed to take whatever step that may be necessary to secure reduced rates, not only over its own line, but also over those of its rivals, for brickmakers and those engaged in allied pursuits. But independently of these considerations the BALTIMORE AND OHIO should be selected as the route of those attending the meeting, because it is the shortest line to Washington.

From both Chicago and Cincinnati two vestibuled limited express trains leave daily and run through without change to Washington, passing over the crest of the Alleghany mountains, where nature displays the most picturesque scenery she has created on the American Continent. We would suggest to those having in charge the transportation arrangements of the Association that they make application for a reduced rate to Mr. Chas. O. Scull, General Passenger Agent, B. & O., R. R., Baltimore, Md.; Mr. O. P. McCarty, G. P. A., B. & O. S. W., Cincinnati, or Mr. L. S. Allen, A. G. P. A., Chicago, any one of which gentlemen will give courteous consideration to any propositions advanced by the Association, and will exert himself to serve the Association just as it wants to be served.

For most of the brick and tile makers it will soon be time to hang up the shovel and the spade and the adjectives, turn the blind horse out to rough it, leave the sheds open and the cart and harness out all winter. It is nearly time to forget all about the schools of instruction that different States have, viz., the brick and tile conventions. There is no brick or tile maker who is so rich or poor that would not be benefitted by the thoughts and suggestions brought out at those meetings. Turn to a new leaf and be sure the new don't read like the old. Remember, if you do not attend the Illinois Brick and Tile Convention, which meets in the capitol building, Springfield, Ills., January 19 and 20, 1902, and things do not move just exactly according to Gunter next year, we'll not be to blame, for we "gin" you fair warnin'.

W. H. Y.



OFFICIAL ANNOUNCEMENT.

Sixth Annual Meeting of the National
Brick Manufacturers' Association,
to be held at Washington, D. C.,
in January, 1892.

To the Members of the N. B. M. A.:

GENTLEMEN—In addition to the formal requests presented at the last convention by members from Zanesville, Ohio, and Sioux City, Ia., asking that the next annual meeting be held in their cities, we have recently been honored by the following invitation from the craftsmen in and about the National Capital:

WASHINGTON, D. C., Aug. 31, 1891.

To THE EXECUTIVE COMMITTEE,

NATIONAL BRICK MANUFACTURERS' ASS'N:

We, the undersigned brick manufacturers of Washington and vicinity hereby extend to you a most earnest invitation to hold the next annual convention of the N. B. M. A. in this city in January, 1892, and pledge our hearty co-operation in the great work. We believe that our city offers unrivaled facilities for the entertainment of guests and as our brick manufacturing is among the largest in the country, almost every known process of manufacture being in operation here, where the craftsmen may inspect them and make comparison as to the relative merits of the different processes, we feel confident that the best interests of the Association and the clayworking craft generally will be advanced by your meeting with us. We, therefore, beseech you to give our invitation favorable consideration, assuring you that if it is accepted nothing that we can do to facilitate the work of the convention and make the craftsmen's visit to Washington both pleasant and profitable will be left undone:

WM. H. WEST & BRO.

W. T. WALKER & CO.

ALBERT GLEASON,

Pres. Ivy City Brick Co.

WM. C. MORRISON.

JOHN E. HERRELL & CO.

MARTIN & BRO.

JAS. H. RICHARDS.

A. RICHARDS & CO.

THEODORE L. HOLBROOK,

Pres. Wash. Brick Machine Co.

CHILDS & SON.

HIBBS & JONES.

CHAS. FORD.

L. CLEPHANE,

Pres. Va. Brick Co.

J. D. SMALL,

Pres. New National Brick Co.

C. R. MONROE.

Mgr. Capt. Hill Brick Co.

No City in the Nation is more attractive to men of all callings and walks of life than Washington. No American City possesses so much of general interest, and we feel assured that the cordial invitation of the Washington brethren will meet the favor of the craftsmen throughout the Nation and result in the largest gathering we have yet held. We therefore, accept the invitation to hold the sixth annual convention at Washington in January, 1892, and will make announcement subsequently of the exact dates and the arrangements for reduced railroad rates, hotel accommodations, etc., etc.

Craftsmen desiring information as to

the scope and purpose of the Association, requisites of membership or reports of previous conventions are requested to address the Corresponding Secretary, T. A. Randall, Indianapolis, Ind.

We urgently request all American brickmakers to identify themselves with us in the effort to stimulate progress and aid in the advancement of the entire craft.

Very Respectfully,
THE EXECUTIVE COMMITTEE.

J. C. ADAMS, *President*

T. A. RANDALL, *Cor. Sec'y.*

Written for the Clay-Worker.

"THE NEW AND THE OLD."

BY W. A. EUDALY.

Just at this time the public schools of this country, and throughout the world for that matter, are brought face to face with the subject, "*The New and the Old.*" New pupils and old subjects to be taught.

To some extent the brickmaking fraternity is a school similar in many respects to the common schools of the land, especially in this: That the craft, to a great extent, are organized into one body or system of instruction. The National Brick Manufacturers' Association being the head or controlling medium, with its annual proceedings, and various clayworking journals of the country as text books, to say nothing of the complete system of object lessons being taught from day to day by every brick yard in the land.

Again is the resemblance in this, that the brickmakers school is constantly receiving new pupils who are to be taught old truths. Some of these new pupils resemble very much many of the latter day college students, in that, they have some money, but no practical knowledge.

Again, there is a similarity among the teachers of these two great educational systems, in this, that both have many of the old foggy kind. What is to become of one of these frisky, young college boys, who, in his own conceit, possesses sufficient wisdom and tact for any emergency when he falls into the hands of an old foggy, 50 years behind the times, kind of a teacher? As applied to the brickmaker, the novice who selects such a teacher must have a long and well filled pocket-book with a soul full of ignorant patience or soon go out of the business.

But to get back to the subject, "*The New and Old Brickmaking.*"

One of the greatest elements of newness is the men who are at this day, and have been for a few years past, embarking in the business.

How many of us have stopped to think of the number of professional men that are now in one way or other engaged in the manufacturing of clay wares? Suppose some hardy craftsman had said, with authority, in the Hall of

one of our recent Conventions, notably the one at Philadelphia:—"Lawyers, Doctors, Chemists, Bankers, Insurance Men, etc., etc., stand up," do you suppose that new bonds of sympathy, thereby, would have been discovered and added to the already strong cord that binds the craft together? Yet in the face of these facts some of these "Old foggy teachers" above referred to, insist upon trusting the single cord of mud and mud ideas.

And the Banker's golden strand, the Doctor's healing balm, the Chemist's precipitating influence, whereby much of the dross is cast out, the Insurance man's long columns of tontine and life expectancies and the Lawyer's cross-examination, whereby many defects are made known, all these must be rejected in the school of the old foggy.

Let us open our doors and bring to our aid men of sterling worth and intelligence from any and every avenue of life. We do not want to be understood as advocating that the knowledge acquired by the professional man or merchant is in every sense especially to the operating of a brick plant, but we do think that much of such men's business training is valuable at least on pay days. One half of the success of any brick plant depends upon the proper adjusting and making up of the pay-roll.

Watch your pay-roll. Compare the one for September 1891 with September 1890, taking into account the product turned out. But I see I have again gone astray of the subject.

As intimated above, many of the men who are of late years embarking in the manufacturing of the various kinds of clay wares are mercantile or professional men by trade; and consequently have very little of the practical knowledge required, hence they look to some old and experienced man to take charge of the works. In this we think there have been as many mistakes and as many causes of failure as in any other one thing.

Many of the old brickyard men are, in these days of improvement, lost and almost helpless when placed in charge of a modern brick plant.

Were I in need of a man to take charge of my stationary engine I would certainly not seek such among the shoemakers of the city; neither can I understand why an old fashioned, hand brick moulder, though ever so proficient as a hand brick moulder, is for this reason a suitable person to take charge of my dry press or soft mud brick machine. I believe the men of to-day who are having the greatest success in the manufacture of dry press brick know very little, if anything, about the manufacturing of hand moulded brick.

I recently visited a dry press brick plant, where, to my surprise, I found one of the principal stockholders, a hardware merchant, in charge of the machinery. On inquiry I found that this Company had endeavored for three

years to conduct the operating of the plant by employing those who claimed to be experienced brick yarders as per the old methods. It is needless to say the Company lost money. Neither will I say that the hardware man made it a success from the beginning, for he did not, but having *brains* and a desire to learn, promoted, no doubt, by a desire to regain the money lost, he soon learned.

When the dry press brick business fails, as some of the old foggy kind predict, our hardware man will certainly lose a job, as he knows nothing whatever about the soft mud process.

Though some of your readers may not see the "*New and the Old*" in the above illustration, it is offered as a warning to the new beginner not to place too much confidence in the foreman, superintendent or manager whose application for a position is filled principally with recitals of the numerous yards of which he has had charge, and of his varied experience in handling clays, etc., etc.

Give me intelligence with one good "I'll try" or "I'll do my best" as against all boasted experience backed only by careless indifference.

The "*New and the Old*" as applied to clayworking machinery is comparatively one sided, as there is but a small proportion of the machinery now in use that can be justly styled as "old" in point of time of invention.

True, many old principals are being applied to new machines, so is "old electricity" being applied to new inventions every day.

In these days of rapid progress and improvement a demand has been made almost everywhere for better building materials, especially is this the case in large cities. Very rapid strides have been made in this direction, especially in the brickmaking line in the past five years; to say nothing of the great demand now in almost every city and town for a better and more economical street paving material. Hence has grown up an enormous traffic in street paving brick. While brick have been used in some places for paving purposes for some time it is only within the last two years that many of the larger cities have taken kindly to this material, and only since the last Convention of the National Brick Maker's Association have brickmakers themselves come to anything like a unit as to the proper size and shape of a No. 1 street brick; even now some manufacturers talk blocks and odd shapes and sizes, but we have every reason to believe that by another summer all will have settled down to be advocates of the practical thing, viz: uniformity in size and shape, and thus the era of brick for street paving purposes will soon begin the years which are to make this material among the "Old and reliable."

All this demand for better materials has created a demand for better machinery, better burning, better clays,

better management, in fact better everything almost. Hence new machines, new and better plans for constructing brick plants, etc., etc.

True, many of the old methods and appliances in part are still in use and no doubt will remain with us for many generations to come.

And as from year to year new men are added to the roll of craftsmen even these old methods must be new to new men, and the A. B. C., in the brick-making of a generation ago must necessarily be the A. B. C., to the beginner of to-day: Hence the importance of a good crop of a wise and patient infant class teachers, but while this is necessary it does not follow that old methods of teaching should be adhered to.

Let us abandon wherever and whenever we can the old try rule and apply the rule of reason and good judgement: at least in all cases let us have a fair mixture of the two, so that in case it becomes necessary to apply the old try rule of instruction, and no doubt it often will, we may have a reason for doing so.

CORRESPONDENCE.

THESE COLUMNS ARE OPEN TO ALL. THE FULL NAME AND ADDRESS IS REQUIRED BUT WILL NOT BE PUBLISHED EXCEPT WHEN PERMISSION IS GIVEN BY CORRESPONDENT. THOSE DESIRING TO COMMUNICATE PRIVATELY WITH ANY CORRESPONDENT WHOSE FULL NAME IS NOT GIVEN CAN DO SO BY ADDRESSING LETTERS CARE OF CLAY-WORKER.

Employment of Women on Brickyards.

Editor Clay-Worker:

In reading your interesting July "Brickyard Sketches," I note with pleasure that in Mr. Moulding's yard "a part of this work" (piling bricks,—which certainly is not heavy labor,) "is done by women, who, Mr. Moulding says, are more reliable and expert than the men." I was somewhat surprised therefore, to see in following issue of CLAY-WORKER, a criticism by "A. N. Oldtimer," in which he says: "God forbid that such labor should ever be used in this section." The most charitable thing which can be said of such an expression, is, that it shows a bigotry and narrow-mindedness which are truly pitiable, and I am quite certain it does fairly represent the opinion of the *enlightened* Eastern manufacturer.

The most advanced thought at the close of the "nineteenth century" is agreed that the motto with regard to the employment of women should be "a fair field and no favor." If they do not prove equal to the occasion, they will naturally "fall out of the ranks." If, on the other hand, they show themselves "more reliable and expert than the men," it is but *common justice* that they reap the reward.

"The proof of the pudding is in the eating." Mr. Moulding, though an employer of this "God-forbidding-labor," is a living example of an eminently successful brickmaker, and does not seem to have had his life made miserable. If some of the old time "brick men from

the East" would "go and do likewise," they probably would have less "waiting for something to turn up" to do; and the CLAY-WORKER might perhaps contain fewer of the "not re-assuring tales of woe," which lately have been appearing regularly from "this section."

I may add that although I have never employed women in the brickyard, my experience with regard to their labor in other departments, is the same as Mr. Mouldings.
R. M. GREER.

Street Paving Bricks from Ore Washing Tailings.

Editor Clay-Worker:

Within the corporate limits of the town of Anniston, Alabama, are extensive deposits of brown hematite ores, a portion of which are in a gravelly state mixed with large quantities of earth. In order to secure the ore, this material is dumped into an ore washer, which is nothing more than a huge open top, horizontal spiral pug mill, supplied with an abundance of water. By the action of the rotary knives and the rubbing of one particle against the other, the earthy matter is washed from the ore, and in its clean state is discharged at one end and the liquid solution of earthy material runs off at the other end into troughs conveying it to the settling grounds that cover several acres. The heaviest particles precipitate first near the trough, and the process of settling continues until nearly all the solid matter held in solution is deposited.

The grounds are inclosed by small levies, and as the deposit accumulates these levies are raised to retain the material and allow it to settle. Occasionally a low place is left to permit the surface water to flow off. Within these small levies can be found deposited to itself the coarsest sand to almost a gritless material, so fine, strong and tough as to admit of its being cut thin as paper, curling up like shavings from a carpenter's plane. From this deposit a brick is made of great strength and hardness. However, it is not advisable to use the exceeding fine grain material, the shrinkage would be great in both drying and burning. Whilst better adapted material is found deposited with the proper proportion of sand to overcome this objection. This red deposit contains a large per cent. of oxide of iron, burnt to a dark red, and makes a strong and desirable building brick.

When street paving bricks are wanted the burning is continued from 18 to 36 hours longer, during which time the bricks continue to shrink, and are further oxidized into a blue black color, and are thoroughly vitrified without sticking together or warping out of shape at a white heat, which is required to bring them to this condition, resembling somewhat, blocks of cast iron, in color, weight and strength. In the upper portion of the kiln are found mostly hard burnt building, while the

vitrified bricks are found below; with proper care, few are injured in the arches, as little or no cold air is admitted during the burning.

I am told that there are many iron smelting furnaces in this country that wash their ore, and no doubt have similar deposits available, for the manufacture of a terra metallic street paving brick containing all the essential elements of strength and durability.

ALUMINIA.

New York News.

Editor Clay-Worker:

Almost all of the brickyards shut down last Saturday night, and before the close of another week, which will bring us up to the middle of October, not a whistle will be blown on the Hudson over a brick kiln.

This shutting down is fully a month ahead of the average time, and it has not been induced by frost, for we are right in the midst of our Indian Summer. The building being done has not helped the market any, for it closes dull, with a "big demand for buyers," as a facetious brick dealer puts it.

The fact is that the good weather we have enjoyed this Summer has resulted in the making of an immense quantity of brick, which no common, or ordinary amount of building could use up, especially as this seasons output had to be added to the large supply left over from the previous year. I hear stories of four brickyards in this vicinity having been placed in the hands of the Sheriff within the past six weeks, but their location is kept quiet, the facts not being published, except perhaps in the local papers of the towns in which they were situated.

As might be gleaned from the above facts, the season has been a decidedly unprofitable one. A great many bricks were made and sold, but the prices were unremunerative. The stock now on hand is excellent in quality though the quantity is not as large as it was at this time last year.

Prices are not much changed. From \$4.00 to \$5.50 is charged for the different grades of up Rivers and Haverstraws; \$4.00 to \$4.25 for Jerseys; \$2.00 to \$2.25 for Pales, and \$2.50 for extra quality of the latter.

The brickmakers are booming up in politics. Josiah Felter, of Haverstraw, is to be the Democratic nominee for member of Assembly from his district, and Gen. Ira M. Hedges, the president of the Diamond Brick Co., is the Republican nominee for State Treasurer.

R. C. Washburn, of Washburn Bros., the Jersey City brick dealers and makers, who has been at death's door from typhoid fever and typhoid pneumonia, is happily recovered and is receiving the congratulations of his friends.

George S. Shultz, the Rondout brick-maker, has returned from Europe after a very pleasant trip abroad of several weeks duration.

BRIC-A-BRAC.

Enameling Brick.

Editor Clay-Worker:

Having now got the bricks ready for the kiln, our next consideration will be the kiln to burn them in. This is a point that has taken a good deal of clearing up. How to protect the glaze face from the flash of the fire and from the dust, is a question that has been a puzzle to many minds, and various plans have been adopted to overcome the difficulty by kiln building, in your own country, as far as I can see, has kept well abreast of the demand for bricks. The ingenuity of men inside and outside the trade has been brought to bear on this special and particular point, and various principles have been adopted and all sizes of kilns have been built. To such an extent has the faculty for kiln building reached that the skill of the builder has quite overlapped the skill of burner, and, if one may believe all that is said for some of the kilns, skilled labor in the burner is not needed; and, indeed, very little labor of the other sort.

Very early in the history of enamel brickmaking it was thought that some kind of muffle kiln could meet and overcome the difficulty, and these kilns were brought into use—both round and square—but it was soon found that there were other difficulties which had not been foreseen. It took a long time to burn these kilns—ten to fourteen days on full blast was no unusual thing, so difficult was it to get the heat to penetrate through the inner shell of the kiln, and this could not be done unless the firing was well followed up, and the heat well and constantly maintained; and so intense was the heat passing betwixt the inner and outer shell of the kiln, that it was often the case that the inner shell would literally melt away and fall in on the bricks and spoil the lot. Then the cost of coal was very great, forty tons of the best coal for a kiln holding eight to ten thousand bricks was not considered out of the way, and, I have known, eighty tons to be burnt, in some cases. Then, the cost for repairs to these kilns is something. If one of these kilns stood eight months it was said "well done," but it was oftener the case that the whole of the fire holes and the inner lining had to be completely renewed twice in the year. My advice is, don't let any man prevail on you to put up muffle kilns; they are not, from any point of view, necessary; the quality of the brick is not improved in any particular. These kilns have altogether gone out of use in Yorkshire for many years, but they are still used in Staffordshire, England, at one or two places.

Other schemes have been tried of an elaborate and expensive nature, but it would not profit your readers to go through them. Suffice it to say, that they are all, without exception, unnecessary; that they are not conducive to the production of a better class of goods. Therefore, in dealing with this matter, I shall give the results of my own exper-

ience and leave your readers to judge for themselves, with this assurance: That the kiln I shall recommend, is in the highest degree suitable for the purpose; that it is not more expensive than an ordinary brick kiln; that the combustion of the fuel is as perfect as possible, the cost for repairs is very small, and that it is simplicity itself. In construction it is not only suitable for enamel bricks but it is in every way suitable for common and facing bricks, and all kinds of pattern bricks, terra cotta, chimney pots, closet pans and sanitary pipes, and all kinds of sanitary appliances. All that is needed to fit it for any of these things is some inexpensive alterations in the internal arrangements. There is no heavy castings for fire hole doors and frames, and one set of fire bars will last for twenty years.

I had the management of a large works some years ago, making all the goods above enumerated. I found very heavy charges accruing for fire-hole doors and frames, and fire bars, besides masons' work on repairs to fire holes and bags; add to this the heavy consumption of coal, and it made up a total that was a serious drain on the concern. In course of time I had all the kilns taken down and rebuilt on this principle, and the first year entirely wiped out the charge for fire bars. The doors and frames I did away with altogether. I reduced the cost of masons' work permanently by 85 per cent. I reduced the cost for coal by 50 per cent. in the brick department and 35 per cent. in the sanitary pipe department.

I name these things to show to your readers that the most expensive thing is not always the best, but, very often, very much the reverse.

I do not claim for this kiln that it is the best on earth; it falls very far short of many of the kilns operating in your country in two very important particulars—it will not hold so many bricks. About 40,000 of your common bricks would fill it, or about 15,000 enamel bricks, but it is quite large enough for any kind of glaze goods. In the next place it will not burn itself. It is not a crack-your-whip-and-go-on-boys sort of thing, it will want skill brought to bear on it from some quarter.

But you will see it is not an expensive kiln that is needed to make enamel bricks. The fact is, I have made very good enamel bricks in an ordinary brick kiln without the least alteration being made to it, but this is the other extreme. But any one wishing to try it, and having a round down draft kiln, may so alter it, for a very little expense, as to enable them to make good bricks. As far as the kiln is concerned, some square kilns are in use for this purpose; but, taking all things into consideration, round kilns are the best.

In my next paper I shall be able to deal fully with the question of setting and burning, and a few remarks by way of summing up, which will close these letters on enamel brickmaking.

MANAGER.

A Timely Suggestion.*Editor Clay-Worker:*

The Executive Committee's acceptance of the invitation to hold the next annual convention at Washington meets with my most hearty approval. I believe they have hit the nail square on the head. No other city, except Chicago during the World's Fair, will bring out so large an attendance, and when they have once enjoyed the "feast of reason and flow of soul" which can be found at the conventions of the N. B. M. A., they will be sure to come again. I, for one, thank you for the wise choice which you have made, and would suggest that in arranging with the railroads for tickets, that the time be made long enough so that all members can have time to take any side excursions they may desire without infringing on the hours of the convention.

C. H. MERRICK.

Syracuse, N. Y.

Brick Making on the Mississippi.*Editor Clay-Worker:*

As I have seen very little about brick-making on the upper Mississippi in the CLAY-WORKER I will say a few words about it.

In the first place the clay here is strong, dark grey, and when first stirred in the bank breaks up in square chunks. It is from six to twelve feet in depth. Under that is a sandy clay and both mixed makes a strong brick.

The place where I am making brick is on Lake Pekin, the most beautiful place in the Northwest. The yard overlooks the lake and is on the Wisconsin side. The brick when just medium burnt are a deep cherry red, but the hardest ones are dull grey caused, I think, by too much iron in the clay.

I see considerable in the CLAY-WORKER about the color of brick. That is something that can be remedied mostly by the burner. One man may burn a kiln and have good hard brick, but a light color; while another will have a dark brick but no harder. The difference is this: The first one lets in only enough air to burn the wood or coal, while the second one uses all he can without cracking the brick in the latter part of the burning.

I have tried this experiment on a kiln and let in air on one side and kept it out of the other as much as possible to see the results, and one side was dark, the other though equally hard, was much lighter. It must be kept in mind that the only time it makes a difference is just before closing a kiln.

The out-of-door brickmaker has much trouble with tough clay which cracks on the yard in drying. The cracking is all done in a short time after the brick are laid out on the yard, and the only way to prevent it is to cover them up for a short time, perhaps for five hours. One of the best ways to cover them is to have boards fastened together the width of one string of brick and fixed so that they will rest on blocks at the edge of the rows (not on the brick) and leave them

covered up for a few hours until the clay is stiffened so it can stand the hot sun.

F. H. L.

Rock Elm, Wis.

Machinery at Conventions.*Editor Clay-Worker:*

The correspondence columns of the CLAY-WORKER are unique. It is seldom that there are not several important subjects under discussion by men, who, not only are interesting and intelligent writers, but what is more to the purpose, thoroughly practical. Few other papers can show anything to compare with them. Not only does the entire craft gain much information from said discussions, but a friendly feeling seems to be promoted amongst its members thereby.

The subject to which I wish at present to refer, is, "The exhibition of machinery at convention meetings." Several of the brethren have written ably on the point, but if you will allow me to express an opinion, it is that the matter was virtually settled by the first letter on the subject. Mr. Purington, after clearly and impartially reviewing both sides of the question, seems to me to have "put the whole thing in a nut shell," when, in conclusion, he said: "Under our by-laws both classes have equal rights, and goodwill exists. Let it be continued." Amen.

R. M. GREER.

A Few Pointers in Starting a Yard.*Editor Clay-Worker:*

In selecting a location always get as far from the rail road as possible, out in the country is the best; then put your traps a good ways from your clay, that gives more employment and your clay will be weathered in coming in. A good plan would be to get the CLAY-WORKER and write to all the machine factories, patent kiln men, patent dryer men and in fact all the advertisers, asking the best mode of arrangement, best kiln, best engine and boiler, best mill etc. Of course when you are starting you want the best of everything, but when the figures are footed up—W-e-l-l, something cheap will do just as well; then build a cheap shed to dry the stuff in; then you will immediately find some one who has an A No. 1 "Bully-for-Stout" engine and boiler "ten horse power," which you had better buy because it's as good as new. Buy a second hand mill and—no you don't need a crusher, have your men be careful and pick the rocks out of the clay. You needn't have an experienced man to set up your machinery. The boiler and engine will be all together, so will the mill, and you can arrange them to suit yourself. Don't inclose your engine and boiler for a while; they are made of iron and will stand the weather all right.

Put up a kiln that don't require a man of experience to run it; ther's lots of 'em "In the Clay Papers," all you got to do—just shovel in the coal "and very little of that," and the patent does the work.—"Great Thing." Go to your

hardware dealer and buy two or three garden wheelbarrows; they are cheap and light and your men will like them. "They can't haul such big loads." Be sure and make the tile rims very thick, they weigh more and will stand up better; got a wider bottom.—"See?"—Hire some boys to offbear; they are cheaper than men and can get around quicker; they will probably have the stuff in a great many antique shapes for a while, but they'll learn. You can run your engine all right, and that will save nine dollars a week. You see you want to save every thing you can. In starting cheap this way you can gradually work up, and can tell better what you want after a while, and it makes more business. For a while you will try to do all the work yourself, but when you have to stand twice to make a shadow you will hire more men. Then by all means get a foreman, so you can get away and do your swearing in the barn, after some condemned unmentionable has shoved a monkey-driver in the mill. W. H. Y.

Very Good for a New Plant.*Editor Clay-Worker:*

Everything is running smoothly with us. We have been manufacturing brick just one year the 20th of this month and started our second machine the first of June last, and have manufactured over twenty-one million. We are at present shipping to Clinton, Iowa, Ft. Madison, Iowa; Rock Island, Moline; Evanston, Rockford and Galesburg, Ill., with prospects of contracts in St. Louis, Alton, Sterling, Ill., and Dubuque, Iowa.

We were visited by quite a delegation of City Fathers from Dubuque last week; they came to inspect the brick pavements and the brickyards. They were so well pleased that at their next meeting they passed a resolution to pave three miles of streets with brick, and the contract will soon be let.

We are delivering from one hundred and fifty to one hundred and seventy-five thousand per day of No. 1 brick and are manufacturing nearly one million per week. If you doubt the hardness of the sample brick sent you, take one of them to a machine shop and have a hole drilled through it, and when you get the hole through please let me know.

W. S. PURINGTON.

Galesburg, Ill., Sep. 22nd., 1891.

Ben Butler is a figure that belongs to the nation, and Americans from Atlantic to Pacific are interested in this unique American character. *The New England Magazine* has made an arrangement with the publishers of Ben Butler's autobiography, enabling it to publish extracts from the book in the October number, some months before the completed work will be given to the public. The chapter selected is called "Ben Butler's Boyhood," and is especially interesting for its recollections of his youth and for its glimpse of the formative influences of his early manhood.

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tical men will always be welcome. Address all
communications to

T. A. RANDALL & CO.,

81 Massachusetts Ave. Indianapolis.

VALUE OF ASSOCIATIONS AND TRADE CONVENTIONS.

If two men, or a community of men, says an exchange, were to set about exchanging goods and commodities right among themselves, no matter how long they traded, they would not get any richer as a community. Some would come out at the little end of the horn, having goods of less value than before "swapping"; all would be out the time spent in trading. But with ideas it is different. Ten men start out exchanging ideas, and although some may have better ideas and more facts than others, all are benefited by the exchange, no one is in any whit poorer; the time spent in "swapping" is a clear gain to every member of the community taking part in it.

Nothing truer. The wise man travels with his eyes and ears open and is never ashamed to ask questions. No matter how humble the calling of those he meets they know something about their vocation that he does not, and that he would be the better for knowing, and may know for the asking. The merest machine of a hand in a garden or in a factory knows facts and results though he may not have the remotest idea of the philosophy of them. Let the wise man gather the facts and apply the philosophy and the world becomes better by it. This is especially true when men of the same vocation meet to exchange views.

Men of the calling should often

meet in counsel, and how to protect themselves against the outside world should be a secondary matter. How to make the most of the means within their reach should be foremost, and all should be willing to learn from every one. No man can long work in any department of any calling without learning something that would benefit others though told in the rudest form of speech.

SOMETHING FOR NOTHING.

A Chicago dispatch says: Another "national" building and loan association has come to its natural end. It is charged that the men who have been conducting this association have swindled thousands of people from every State in the Union, and have taken from \$200,000 to \$600,000 and given nothing in return. The system was the usual "national" one—securing members on the promise of loans, and not making the loans.

The same old story, somebody wanted to get something for nothing. Sharpers know that the woods are full of them and they ply their wits to catch them. Now it is the scheme to catch big fools by telling that somebody of their name died several hundred years ago in England or Germany leaving millions, which is now tens of millions, and that by expending only a few hundreds they may get it nearly all. Of course the man who wants something for nothing invests the hundreds, and then curses the swindler. He was only a near relative, who wanted something for nothing. The only difference is he got what he wanted, his victim did not. Why curse him? Now it is the farmer who has accumulated a competence by honest industry, but lest he die in the poor-house, he wants something for nothing now that he is old, and he sees it in the patent right, which his next of kin has for sale, and he gives his note payable in bank—he gives something for nothing when that note becomes due, but the other fellow is out and gone with the something he realized on the notes. National loan, national investment or national something else that promises something for nothing is the same fraud by a different name. But why need we waste ink in writing about it? The fools are not all dead, and the fool catcher knows it. Our only hope is that the readers of the CLAY-WORKER have not taken it bad yet, and that a hint to them while they are not yet

clear gone, may save them. Don't expect something for nothing. Only fools do that.

FORWARD MARCH.

Surely the clay world moves. A short time ago it was a question as to the manufacture of tile roofs. Now there is a discussion as to which kind of a tile roof, as the columns of the CLAY-WORKER indicate. This is progress. To be sure tiles have been made to a limited extent in this country for several years, but it was like a finger pinch from a clay bank as compared with what it may be. We have agitated this question; we have clearly demonstrated that a clay roof is the one roof, and now we are pleased to see that the discussion has reached the point where it is not a question as to a tile roof or some other roof, but as to what kind of a tile roof. The hotter this discussion becomes the more encouragement may clay workers see in the general movement in the right direction; out of discussions of no matter what character comes direct progress.

We see the same thing with respect to enameled brick. Our correspondent abroad made suggestions with respect to making enameled brick at a low cost. Being an architect of experience, he knew their constructive value and was able to estimate the public demand. While he did not pretend to understand the detail of the manufacture of enameled brick he was able to understand the market for such a material. We all know that enameled brick has been used to about the same extent as tile roof coverings in past years. They sold at a high price, and were the occasional rather than the general wall covering. Years may roll by with a high priced, badly marketed enameled tile, and yet yield little benefit to American clayworkers.

In a letter to the editor Mr. Gibson says: "If our people in America had a glazed brick with a surface no better than a piece of vitrified drain tile they would use it. It is clean and adapted to many places which are now plastered or painted and which soon fall into decay. A cheap vitrified brick would be the entering wedge. Let it be a vitrified tile glaze, a jug glaze or what not, but a glaze, and a cheap glaze. Get the people started on it; let them see and know what it is; give them a little kindergarten education and the vitrified brick will soon become a necessity. Then we will have glazed brick, enameled brick

and what not, as one of the public necessities. People can pay a low price and get a cheap product, or they can pay a higher price and get a better one. But in all matters of this kind the supply makes the demand. It is a matter of education. People want an enameled brick or glazed brick, or something clean. They do not know what it is. The public are not able to say: "We want a particular kind of enameling or glazing," but when they see it they will know that they want it without being able to name it. They will pay for it. After people understand these things they become necessities, and after that they will pay any reasonable price to get the right thing, but they must be gradually moved up to it. The fact that glazed brick is made in England at a high price indicates nothing to us. The Americans look forward rather than backward in such matters. A little experimental work on the part of some of our progressive American clayworkers will bring this matter around all right."

Here we have the same matter for encouragement in respect to enameled brick. Clayworkers are certainly more responsive to suggestion than any other class of artisans. It does not take years of pounding and hammering to make an impression.

The above statement is proved with respect to the brick paving movement. Only a short time ago brick paving was hardly a subject for discussion; now it is not a question of paving, on general principles, but one of method and detail. Surely the clay world moves.

PROSPECT FOR A GREAT EXHIBIT.

In response to an inquiry as to the progress being made in arranging for an exhibition of clayworking machinery at the World's Fair in 1893. C. W. Raymond, of Dayton, Ohio, Secretary of the Committee of the N. B. M. A., having the matter in charge, writes: "Responses to the circular letter issued by the Committee are coming in copiously and favorably. I am led to believe thereby that the manufacturers as a whole appreciate the great value of such an exhibit and will unite enthusiastically to make it a success."

We have no doubt that the display of clayworking machinery will be the largest ever made. The one chief difficulty we anticipate is the allotment of sufficient space to accommodate all who

will want to take part in the exhibition. This is the point the N. B. M. A. Committee is endeavoring to gain, and if the machine manufacturers will reply promptly and fully to Secretary Raymond's communications, more liberal arrangements can be made with the Exposition board than can otherwise be hoped for. Prospective exhibitors will further their own interests by furnishing Secretary Raymond the information he requires.

RAINMAKING VS., BRICKMAKING.

Artificial rain-making is all the rage now, even the government is into it, and is furnishing the money wanted for experimenting, and reports have been in circulation that the project is a success in several instances. Suppose it is, what then is to become of the brickmaker? He sighs for no rainy weather, at least over his own brickyard. He can best make brick, just as the farmer can best make hay—when the sun shines. Besides, no one has yet evolved any process by which the rain can be stopped when once started. It is even possible that the farmer may get more rain than he had contracted for. And, further, some farmers may not be ready when their neighbors are. This may lead to serious neighborhood broils, if not to death itself. Imagine a farmer in the height of haying, a little behind his neighbors, who are through, and are setting the rain-making machine to going. Will he submit in silence unless they confine the down-pour to their own acres? Certainly not. And there always will be tardy farmers. No doubt some farmers as well as possibly some brickmakers will want Gabriel to wait a while when he is about to blow. But suppose his nearest and best neighbor is a brickmaker. Now while the brickmaker is piously resigned to the weather when it comes of itself, and falls upon the brickyard just as it does on the farm, for old fashioned rains fall upon the just as well as the unjust, he may be expected to kick when his farmer neighbor evokes a rain upon his crops that is almost sure to spoil thousands of undried bricks. Then again, as said before, what arrangements have been made for stopping the rain when the farmer has enough? Fortunately for the peace of society, and the good of the brickmaker, the brickmaker who is up in his calling, need not be dependent on sunshine for drying his brick. Artificial methods of drying are coming into use to offset not

only artificial rain but real rain of the old fashion; and we must earnestly recommend all brickmakers to thoroughly study them and speedily adopt them. It will not take many yards full of soft brick, needing sun but getting rain, to pay for these boons to the craft.

Anthony Ittner, the well known brick manufacturer of St. Louis, looked in upon us recently. He was on his way home from the midsummer meeting of the board of directors of the National Association of Builders. Mr. Ittner is Vice President of that body and has rendered them much valuable assistance, as he has also the National Brick Manufacturers' Association, of which he is a charter member. He expressed himself as well pleased with the selection of Washington, D. C., for the next annual meeting, and predicts that it will be the largest attended Convention yet held. His new dry-press brick works at East St. Louis is now fully underway, producing a splendid grade of ornamental brick.

Fritz Wagner, Secy. of the Northwestern Terra Cotta Co., Chicago, Ill., has returned from a four months trip through Europe. Mr. Wagner visited many of the principal cities on the Continent and, of course, took particular note of the clayworking industries. He thinks their brick, which are mostly made by hand, are neither better nor worse than our ordinary hand made brick, but are smaller, being only about $5 \times 3 \frac{1}{2} \times 2 \frac{1}{2}$. In enameled brick and terra cotta however they are ahead of Americans. The most remarkable piece of claywork he saw was a chandelier of Majolica, which hangs in the Kings castle at Chiemsee. It is an immense affair having a great many burners and must have cost a vast sum. It was burned in a kiln erected especially for it.

C. C. Clarke, Mayor of Peoria, Ill., in a private letter of recent date, relative to the cost and durability of brick pavements says: "The brick laid in the pavement, including excavation, gravel foundation and curb setting, costs about \$1.82 per square yard. The oldest pavement we have had down is six years in use and shows no perceptible wear, and I should judge from our experience that it would last for 15 to 25 years, according to the nature of the travel. All our pavements are now being made of brick, and are giving good satisfaction."

EDITORIAL NOTES and CLIPPINGS.

Anderson, Ind., is to have a fire clay pot factory.

S. G. Clark will start a brick plant at Columbia, Ala.

McClure Bros., McClure, Miss., want a brickmaking outfit.

J. H. Robinson is making brick at East Concord, N. H.

The Blandford (Mass.) Brick & Tile Co. is enlarging their plant.

W. F. Parkhurst and others will build brick works near Atlanta, Ga.

Brick works are to be established at Chess City, Va., by John Fair.

The Urbana (Ill.) Brick Company has been incorporated. Capital \$20,000.

John Deehan, of Bryn Mawr, Pa., will engage in the brick business at Bridgeport.

The Malvern (Ohio) brickyards will turn out over a million paving brick this season.

The Caledonia Brick Company, Grand Rapids, Mich., has been incorporated. Capital \$21,000.

Nearly all of the brickyards along the Hudson have shut down. The season has been a very unsatisfactory one.

The boiler in the Greencastle, Ind., Brick Company's works exploded, killing James Able. The cause of the explosion was lack of water.

The Terra Cotta Works at Elsinore, Cali., which were burned recently will be rebuilt at once. C. C. Merrill is General Manager.

Our readers will confer a favor on us and our advertisers too, by mentioning the CLAY-WORKER when writing about machinery, etc.

C. M. and H. A. Irish have purchased brick works at Buckfield, Mass. They have built a dry house and will add some improved machinery.

The Kokler Brick Company, Toledo, O., has been organized with capital of \$25,000. Robt. Cummings is president, and Frank Gorman secretary.

The Owen Tile Co., Tarrytown, N. Y., has been incorporated with \$50,000 capital. Pres. C. R. Owens; Secy. A. P. Husted; Treas. B. H. Engelke.

The Ligonier (Pa.) Fire Brick Company has been chartered by H. J. Brunot, A. B. Kline and others, of Greensburgh, Pa. Capital \$40,000.

C. D. Overman, an enterprising merchant of Fairmount, Ind., recognizes a good thing when he sees it, and has opened a brick yard of 25,000 daily capacity. His machine is the "Anderson Chief;" gas the fuel, and a *first class* hard, red brick the product. This yard will be run the year round.

A fire which caught from a kiln broke out in M. B. Paige's pottery, Peabody, Mass., Oct., 3d, causing about \$2,000 damage. The insurance is \$1,000.

C. C. Reese, of Elizabethtown, Pa., has purchased the brickyard formerly owned by J. C. Keener, and intends to put in machinery ready for work in early spring.

The brick manufacturers of New Hampshire have generally had a prosperous season. In and about Portsmouth the output exceeds that of any previous year.

Houston, Tex., wants paving brick for her streets. Major E. Z. Cane, of that city, has been investigating and says there is good clay near there for making vitrified paving brick.

The engine house, machinery, tools and sheds in the brickyard of Frank Stiles of North Haven, Conn., were destroyed by fire the 4th, inst. Loss, \$15,000; no insurance. They were arranging to burn with oil instead of coal, and the fire started in some way in the engine room.

Anderson & Kenward, tile manufacturers at Roberts, Ill., are thinking of adopting oil as a fuel, and would like to correspond with parties who have used oil in round down-draft kilns.

Some good, reliable experienced workmen advertise for situations in the "For Sale, Wanted, etc.," columns. If you want something, or have something you don't want, keep an eye on that department.

Geo. Carnell, of Philadelphia, has issued a neat catalogue of his steam power brick machinery, clay tempering wheels, repress, etc.; a copy of which will be mailed free to any one on application.

The works of the Central Press Brick Co., at North Baltimore, O., which were burned recently, have been rebuilt on a larger scale, and are now in operation again under the supervision of W. D. Richardson.

Fletcher & Thomas are now preparing to publish their new catalogue for the coming season. This will be illustrated and descriptive in every particular with

many items of interest to brickmakers. The testimonials of the work of the New Quaker Machine and their Spiral Pug Mill are most flattering in every particular.

A contract has been made by the Wabash Railway with the Davy Clay Ballast Company, of Kenosha, Wis., for furnishing burnt clay for twenty-five miles of the Wabash line between St. Louis and Kansas City.

George Hammond, John Connors and Timothy Sweeney, employed at De Long's brickyard near Glen Falls, N. Y., claim that they loaded, wheeled and tossed 50,000 bricks in a kiln in eight hours and forty-five minutes.

Joseph Pettit pleaded guilty a few days ago to the charge of importing from Canada laborers to work in the brickyard at Bridgewater, Mass., in violation of the Allen Contract Labor law, and was fined \$300 and costs.

M. J. Scheiderer, Richwood, O., writes that the brick and tile trade in his section is dull now, but that the prospects are good for a decided improvement soon. He is using an "Ohio" machine, and is much pleased with it.

The Somerset Potters Works Co., Somerset, Mass., report a rapidly increasing demand for the Johnson patent process machinery, which is advertised on page 308. They have recently booked an order for a complete outfit, including machinery and kilns, for the Westmoreland Fire Brick Co., Pittsburgh, Pa.

Mr. Henry Deering, East Peoria, Ills., will put in an extensive building brick plant. He is an old and experienced brickmaker, having made brick by hand the greater part of his life. He purchased a large machine and Automatic cut off through Mr. G. C. Stoll, agent for the Adrian, (Mich.) Brick and Tile Machine Co.

The Harriman, (Tenn.) Brick Co., is one of the progressive institutions of that thrifty Southern city. In addition to their extensive works for the manufacture of common brick they have recently put in a complete equipment of Johnson's patent process brick machinery for the production of pressed and front brick, and are now making an excellent grade of front brick in quantities that will enable them to fully supply the demand in that section. They are very proud of their new plant.

Just after having been awarded the contract to furnish 1,500,000 Paving Brick to a large Eastern City, the Central Clay Co., London, Mills, Ills., had the misfortune to have their machine go broke on them. They immediately replaced it with one of greater capacity from the Adrian Machine Co., Adrian, Mich., through Mr. G. C. Stoll, their agent.

The Adrian, (Mich.) Brick & Tile Machine Co., write that they are having an excellent trade for this season of the year. During September they have put in outfits for F. Plumb & Co., Streator, Ill.; Central Clay Co., London Mills, Ill.; Doney Bros., Catlin, Ill., and H. C. Patton, Flanagan, Ill., and are now getting ready a large outfit for H. Doering, East Peoria, Ill.

The Wallace Mfg. Co., Frankfort, Ind., report a satisfactory business. The demand for the Little Wonder brick machine continues to increase as its merits are better known, and their automatic cutting table is proving remarkably successful. In no instance has it failed to give entire satisfaction. The inventor, Mr. Cunningham, is justly proud of the work it is doing.

E. M. Freese & Co., formerly of Plymouth, O., have moved their works to Galion, O., where they are comfortably installed in a new factory, fully equipped with the best machinery and appliances for the manufacture of their line of clay-working machinery. With their increased facilities they now expect to more readily meet the demand for the "Ohio" brick and tile machinery, which has always been popular.

Fletcher & Thomas have made a practical display at the Indiana State Fair of one of their complete Brick-making outfits, consisting of the New Quaker Brick Machine, F. & T. Spiral Pug Mill, and Potts Mould Sander and Disintegrator, and Atlas Engine. This outfit was geared by their latest improved method, by which they do away with line shaft, extra pulleys and belting, and thus decrease the power formerly required by 5 to 8 horse. The brick turned out constantly during the week were pronounced by all old brickmakers as the finest they had ever seen and almost equal to re-pressed. This firm also had on exhibit a full line of brick-makers supplies, including one of Raymond's No. 2 Re-press Machines, showing the process of making ornamental brick.

The brick trade in Philadelphia is constantly improving, much to the delight of the manufacturers who have had a hard time for the past few months. The Peerless Brick Co., has received the contract to furnish the buff bricks for the Reading Terminal station and train shed. While no amount has been specified about a million and a half buff bricks will be used of the same quality as those used in the Drexel Institute. The Equitable Brick

Co. will furnish the bricks for the school house at 42nd and Jefferson Streets, the addition to the Powelton Electric Light Plant, amounting to 400,000 and 200,000 along the Pennsylvania Railroad.

The Indiana Clay Shingle Co., of this city, report an embarrassingly large trade. The demand for their Fire Clay Roofing Tile has outgrown their capacity. They have sold all the tile they can make for several months to come, and now must either enlarge their works or turn away empty those wanting tile for early spring use. From the inquiries coming in they evidently will be unable to make tile enough to supply this market, and will, therefore, try and secure the establishment of another factory in this section. Anyone having capital to invest will find this a splendid opportunity, for there is a great future for this industry. Mr. Jno. R. Elder, president of the Clay Shingle Co., will gladly give those interested any desired information.

The exhibition of clayworking machinery at Fairs and Expositions has been on the decline for several years, the manufacturers finding that, as a rule, the expense and trouble was not justified by the returns. The great St. Louis Exposition, which is now running, has but three exhibits in this line. Chisholm, Boyd & White, of Chicago, show their new massive six mould press to excellent advantage, its fine mechanical appearance challenging the admiration of everyone. Near them the St. Louis Iron & Machine Works, exhibits their monster "Lion" dry-press and a splendid line of steam engines, while further along the line we found the Adrian, (Mich.) Brick & Tile Machine Co., exhibiting their stiff clay brick and tile machinery, automatic cutting table, crushers, etc. The Exposition closes October 17th.

Messrs. F. Plumb & Co., of Streator, Ills., have about completed what will be the nicest arranged tile and brick factory in that State. They have two new steel flue boilers, forty-eight inch shell, twelve feet long; sixty horse-power engine. Their machine room is, contrary to the rule, very large and airy, and all the floors are laid to have a slight grade, so as to be lighter on the truckers. They will have two clay soak pits, with a thirty-seven foot clay conveyor between them, the farther end of the conveyor to be three feet below the level of the ground, so that instead of the clay being lifted up, it is pushed down into the conveyor. From the conveyor the clay passes into a crusher, then into a long pug mill, which drops it into the mill. The machinery was purchased through Mr. G. C. Stoll, of the Adrian Brick & Tile Machine Co., Adrian, Mich. Mr. F. Plumb has been connected with the brick and tile industry for a great many years, and the present arrangement shows that the gentleman has given the subject a great deal of thought. They have completed two round down-draft

kilns, twenty-four feet in diameter, with two doors to each kiln, and will build two more immediately after they get brick enough of their own manufacture. After they get fairly started they will mine their own coal; will also take out shale, of which they say they have a fine quality for making paving brick. Success to you, gentlemen.

PAVING BRICK.

Manufacturers of paving brick will find the little 48-page book entitled "Durability of Paving Brick" a very valuable aid in introducing brick in localities where, from lack of information, the value of brick as a paving material is questioned by those in authority. It is an authentic statement of the comparative merits of the principal paving materials and proves conclusively that brick is equal or superior to all others. It should be distributed generally by those interested in advancing the paving brick interests. Price of single copy 25 cents. Special rates will be made to manufacturers ordering large lots for distribution. Address the publishers, T. A. Randall & Co., Indianapolis, Ind.

A NEW AND VALUABLE BOOK.

"BRICKMAKING AND BURNING," T. A. Randall & Co., Publishers, Indianapolis, Ind., price \$2.50.

This is a handsomely bound and valuable work, being a practical treatise on Brickmaking and Burning and the management and use of different kinds of clays and kilns for burning brick, with a supplement for new beginners in that work and hints to bricklayers and builders. The author, J. W. Crary, Sr., is a successful brickmaker of many years' experience, and in this book has given in a plain, practical way, his views and experiences in all the details of the work. The book is a veritable storehouse of knowledge on the subject and should find a place in the library of every worker of clay.

KILN PLANS.

A large number of brickmakers are availing themselves of the opportunity to obtain complete building plans of the central flue, round down-draft kiln at a small outlay. The plans and specifications are invaluable as a means of reference, and are worth many times the price asked for them. Address P. Arnold, Supt. Dover Fire Brick Co., Canal Dover, Ohio.

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THE Frey-Sheckler Company announce a new Cutting Table,

"THE GALESBURG,"

For side or end cut Brick.

Galesburg, Ill., has earned an enviable reputation for producing the highest grade standard Pavers.

Everybody interested in Pavers and every projector of a plant, goes there to learn their processes and witness the operation of their Machinery.

Mr. Boltz, foreman of the manufacturing department of the Galesburg Pressed Brick Co. has achieved still better character for his city by the invention of an ingenious, simple and cheap Cutting Table, by which one man can easily cut 50,000 to 75,000 brick daily without overwork or especial skill. A good 16-year old lad can cut 30,000 daily without sweating.

The end cut brick are delivered on belt, the side cut on either belt or board.

It will cut Brick, Tile, Terra Cotta, or other ware up to 8 inches in diameter, and may be built to cut any size.

Mr. Boltz has arranged with the Frey-Sheckler Co., of Bucyrus, O., the veteran manufacturers of Brick Machinery, for the introduction of his new Table. Five Tables have already been put to work and are earnestly complimented by owners and operators.

Their cheapness, (\$100.00) is a long way below the figures of other rapid Tables. The wires always cut down and do not pass back through the column of clay, by which a smooth edge is always obtainable. A common laborer can learn to operate it in an hour. Any ordinary man, whether skilled in machinery or not, can set it up and operate it on first trial.

It cuts six end cut or eight side cut brick each downward movement. Simply keep pulling the lever and the Machine will do the rest.

For Catalogue giving full description of extensive line of Clayworking Machinery address, **THE FREY-SHECKLER Co.,**
See ad. on page 383. **Bucyrus, Ohio**

THE CLAYWORKER.

VOL. XVI.

INDIANAPOLIS, IND., DECEMBER 15, 1891.

No. 6

Written for the Clay-Worker.

THE CONVENTION CITY.

The National Capital, where the Sixth Annual Meeting of the N. B. M. A. is to be held Jan'y 12 to 16 '92.

WITH several days still available for convention uses, the city of Washington has, in this year of our Lord, one thousand and eight hundred and ninety-one, piled up a wonderful record as a place of assembly. Other centers of population in the United States re-

to meet here again. The numerical strength of the record would have been as sounding brass or tinkling cymbal had those who participated in the many gatherings gone away dissatisfied with the treatment accorded them. At last a score of the more important societies in this land have engrafted on their governing statutes provisions which fix the Nation's Capital as their annual or semi-annual meeting place; and this example is being rapidly followed by those who recognize a good thing when they see it. For this course

Attractive as Washington is, to all classes and nationalities it must be more than ordinarily so to those who work in clay, for Washington is built of brick. The spectator who looks down and out from the dome of the Capitol or the top of the great obelisk sees beneath him the great mass of red, geometrically divided by grayish lines which on closer inspection prove to be the streets and avenues. From early springtime until the leaves wither and fall long bands of green relieve the dark red monotony, and, touching the horizon, blend with



FRAGMENT OF SCULPTURED FRIEZE, NEW PENSION BUREAU BUILDING, WASHINGTON, D. C.—EXECUTED IN BUFF TERRA COTTA BY THE BOSTON TERRA COTTA CO.

ceive a modicum of attention when reunions and business meetings are to take place, but Washington is the great national magnet. More than two hundred bodies, representing every phase of scientific movement and touching every point of human endeavor, have assembled here since last January commenced to be. That, of itself, would be an astonishing record for any city, but there is much more to be told. It can be told, however, in few words: Not one of these bodies, but what is anxious

there are two principal reasons. In the first place, Washington is essentially a deliberative sort of a city; no great hurly-burly of business interrupts the smooth and comparatively noiseless current of its existence. Secondly, its hotel accommodations and scenic attractions are not equaled anywhere. Of course, PEOPLE WHO ATTEND CONVENTIONS have other things to do besides sight-seeing, but in these days the wise man tempers dry avocation with a reasonable quantity of rational pleasure.

suburban fields and summer skies; at this season, the million shade trees, as seen from the monument top, are lost in the natural-tinted highways. Here and there are patches of white—the Executive Mansion, the State, War and Navy Building, the Treasury Department, the Interior Department, the Postoffice Department and the Soldiers' Home—but the greatness of Washington edifices is the *product of the brickyard*. The brown stone house is almost unknown here and the frame building is rapidly

vanishing; the disappearance of the latter being due to a law which forbids inflammable construction within the city limits.

Principal among the brick structures—towering high above everything in its vicinity—is the Pension Office. Fifteen millions of brick have been combined into the best office building the United States government ever had. The humorist and the would-be humorist have ridiculed its style of architecture but no one who knows anything about construction or the needs of a great public department has anything but praise for the Pension Office. It is said that Gen. Sherman once told Gen. Meigs, who was the architect and builder, that there was but one thing the matter with the big building, and when Gen. Meigs made inquiry as to the nature of the ailment Sherman replied: "Well; its fire-proof." The exterior is undeniably plain but even that—its least attractive feature—is preferable to some of the rubicund architectural nightmares which horrify esthetic souls in almost every city. A pleasant feature is that afforded by the broad band of terra cotta around the building on the first story. This decoration is a little more than three feet wide, and as it goes around the entire structure is just 1,200 feet long. On this frieze in high relief, are figures representative of the Union forces employed during the late war—cavalry, infantry, artillery and seaman. This frieze-work, artistically considered, is one of the finest examples of terra cotta work in existence. Carping critics have made much of the somewhat singular fact that all, or nearly all the horsemen hold the reins in the wrong hand, which, paradoxically, is the right hand. The frieze was photographed in sections before being put in place, and by the courtesy of Gen. Meigs one of the more striking prints has been made available for reproduction in the columns of the CLAY-WORKER. The Pension Office interior is perfection itself, the great court being used quadrennially for the inaugural ball.

To fairly catalogue only the more interesting branches of the Governmental service is a work of no small magnitude, and to give to each one even the least description would take more space than could now be placed at the disposal of such a subject. Those who come to the convention in January and who have never been here before will find a new world, full of bewildering

surprises; those who have some previous acquaintance with the city cannot fail to discover novelties that were undreamed of when they last paid the center of government a visit. There is the Capitol with its wealth of historical reminiscence and association; the home of the Nation's Legislature, the place of session for the Supreme Court, the temporary shelter of the great Congressional Library; the Executive Mansion, with its magnificent apartments and pleasant surroundings; the house in the great East Room of which Mrs. John Adams was accustomed to hang the presidential linen to dry on washdays; where Jackson swore "By the Eternal," and where Lincoln signed the Proclamation of Emancipation. Each department has some feature of especial and popular interest. The State, War and Navy Departments are all in one building, the best example of the Italian renaissance in the world, planned by A. B. Mullett, and erected at a total cost of \$12,000,000. A week might easily be spent in seeing all that is worth seeing in the Treasury Department. Ten millions of dollars have been spent on it since the foundations were dug in 1833. A permit from Treasurer Nebeker will admit visitors to the money vaults and the curious collection of counterfeits made by the secret-service officials is open for inspection during office hours. At the Bureau of Engraving and Printing all the paper-money is made; this place is worth visiting. The Post Office and Interior Departments will repay anyone for the trouble incident to a call. In the latter building is the Patent Office Museum, with its thousands of models—a practical history of American genius. The Department of Agriculture is one of the popular places. It is more picturesquely located than any other branch of government. The Smithsonian Institute and the National Museum are centers of interest to all visitors. The Museum building is an odd, yet pleasing structure, red, blue and buff bricks having been arranged so as to produce a novel effect; a finer museum does not exist on the Continent. Larger than any other printing and binding establishment in the world is the Government Printing Office, and no tourist can claim to have "done" the city without going through the immense building. Guides are provided in nearly all the government offices, so that visitors are not necessarily taxed; they are safe from imposition anyhow.

But Washington is not wholly governmental. The Corcoran Art Gallery is a delightful attraction; there are theaters equal to the best, hotels of the most pleasing description, such public markets as are not to be found elsewhere. The finest of public school buildings may be inspected. In the old-fashioned City Hall are the rooms where many celebrated cases have been tried. Churches, almost without number adorn prominent sites. The Zoological Park is a good place to go to at any time, and although the word cemetery is a gruesome thing there is nevertheless an attractiveness in some Washington cemeteries. Who would not be interested in the great aggregation of dead Statesmen at Congressional, and whose soul would be unresponsive to a brief sojourn among the tombs at Oak Hill, where so many illustrious Americans rest, and where lies the dust of him who, though dying in a foreign land sang "Home, Sweet Home" with that spirit and understanding which could only be possessed by the author's.

All parts of Washington are easily accessible. Street-car lines touch the more important points within the city limits and in some instances go far beyond the imaginary line into the suburbs. Those who desire to secure a more thorough knowledge of the city's beauty and greatness than could be secured while on street-cars might easily make a less profitable investment than that of a dollar for a cab in which to drive past some of the more noteworthy residences, among which may be classed the foreign legation buildings.

Washington has many suburban beauties. They demand a chapter for themselves. GEO. H. HARRIES.

CHRISTMAS.

Not by glad Christmas bells alone;
Not by the crowded, warm hearthstone;
Not by the quip, the clasp, the feast—
Scarce by the one star in the East—
Nor yet by gift or deed of grace,
Nor mistletoe, nor wreathed place,
Nor merry speedings to and fro,
Nor any circumstance or show,
Cometh the Christmas Day.

These are but symbols,—hallowed, dear,
The cherry crowning of the year.

By the light in childrens' eyes,
By the blithe shouts and happy sighs;
By secret plottings, fond and deep,
When little heads lie still in sleep,
By glowing sympathy that starts,—
Melting the winter in our hearts;
By quickened joy and holy pride
When to the child all doors swing wide,
Cometh the Christmas Day.

—Mary Mapes Dodge.

Written for the Clay-Worker.

HINTS ON BRICKMAKING

No. 58.

BY R. BRICK.

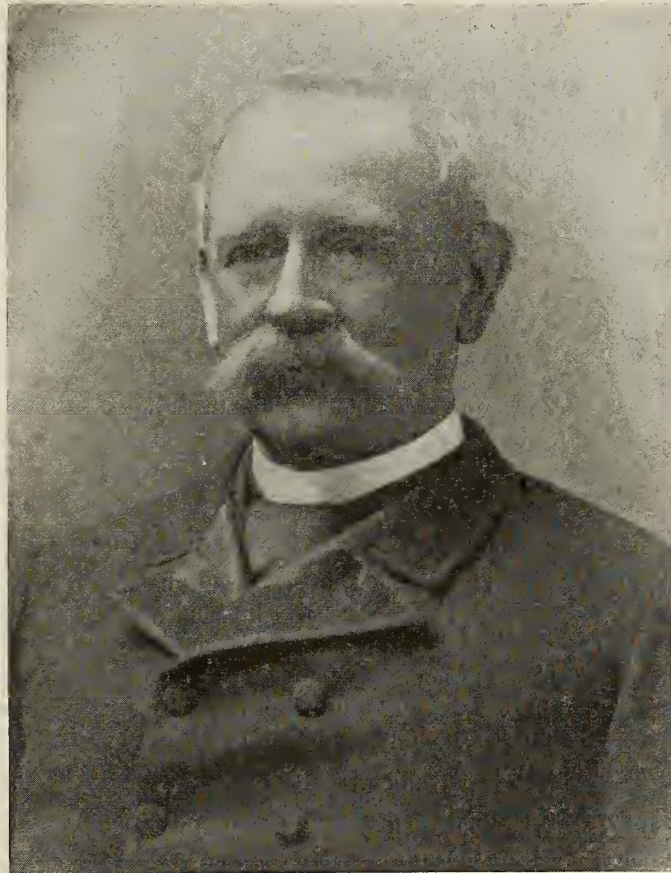
BRICK MACHINES.

OUR friend, Timothy Tinker, in the November issue, criticizes my article on brick machines in the preceding issue. I can not, in these articles, enter into a discussion with any one, and it is not the intention of the writer to do so. For fear, however, my friend Tinker might feel slighted if I were to pass his remarks by without comment, I will make a brief reply.

He says: "I fear 'R. Brick' has been listening to the 'taffy' of some machine manufacturer or smooth tongued representative that builds only one size machine." I admit that I live in the woods a good way back from the road, and get most of my pointers on brickmaking from these ubiquitous machine men. This fact alone will account for any wild ideas I may have on the subject. Friend Timothy thinks the purchaser is not the one to choose in buying a machine. If he buys at all he must make a choice, or buy a machine from each and all the machine manufacturers. Another question he asks is: "What would you do if both of the small capacity machines were to break at the same time." I can only answer for myself. I would at once start the other two, as we have four machines. Now, friend Tinker, to be candid, have you not "automatically" "cut off" more than you can chew. My critic, however, in the course of his interesting article gets in some good licks for the large machines. There are many arguments in favor of the large capacity machines, to offset some that can be offered in favor of the smaller. There are so many things to be taken into account, before these questions can be decided properly. In some localities large machines are best; in others smaller machines are preferable. The quantity of brick to be made daily must be taken into consideration. With men or firms of large means the first cost of a

machine may not be a matter of much moment, while others with limited means must consider carefully the question of cost. In relation to capacity these facts are familiar to every brickmaker who has given the subject any thought.

The main point in the first article was that brick machines, as they were made of greater producing capacity, increased in price a great deal faster than they did in their output of brick. My critic seemed to miss this point entirely. Perhaps I failed to make it sufficiently plain. The very best way to



WM. C. MORRISON, BRICK MANUFACTURER,
Treasurer Builders' Exchange, Washington, D. C.

determine the best machine to purchase is to compare notes and experiences with other brickmakers. Find one with clay similar to yours, who has been using machinery. He can give you the benefit of his experience without cost to you, although he may have paid well for his information. There is no doubt that this is the only reliable way to get information without experimenting for it. The question arises next, how can a brickmaker, desiring to purchase appliances for improving his plant, get this information without traveling hundreds of miles and spending a large sum of money and much valuable time. A few

years ago this query would have been hard to answer satisfactorily. Now, it can be answered promptly. We now have a National Association of Brick Manufacturers, composed of earnest, energetic, practical men, who take pride in their business; men who have given this subject their closest thought and attention for many years. These brickmakers meet in convention once each year, and listen to the opinions and advice of, perhaps, the most successful brickmakers in the country. It is an exposition of scientific and practical ideas on brick-making. Here theory and practice meet in the furnace of debate and are welded into one harmonious opinion. A large majority of those who attended the first convention have attended each succeeding one. Each convention has the benefit of the preceding ones, and each recurring meeting brings in new members to add their gems of thought and experience, and receive in return ten or perhaps one hundred fold. It is hardly necessary to add that here, for a week's time and a few dollars expense, the brickmaker can get the reliable information he seeks, whether it be regarding machinery of whatever kind, from a steam shovel to handle clay, cars to move it in, engines to bring it to the works, crushers, puggers or disintegrators to prepare it, machines to mould it into bricks, cars to move the product to dryer and kiln, every mode of drying and every process of burning, direct from men who operate these appliances.

Could any reasonable or unreasonable man ask for any better opportunity for obtaining this valuable knowledge.

The next annual convention will be held in Washington, D. C., January 12 to 16, 1892, a most interesting city, where can be seen some of the finest structures in the world. This city is convenient to every part of the country lying east of the Mississippi River, and Western brickmakers do not take distance into account. When they see a good thing they go and get it. Brickmakers of America, lay aside your business cares for a week and meet the brickmakers at Washington, mingle with them freely,

and when you return home you may not look so pretty as when you left, but you will be sure to know more, and you will think you never made a better investment. *Don't fail to come.*

Written for the Clay-Worker.

DRYING BRICKS.

No. 1.

BY S. GREEN.

HOW TO "RAISE THE WIND."

IT is with pleasure that I attempt to respond to your kind invitation to contribute a series of papers to the CLAY-WORKER on drying brick, and, with not a little reluctance, give my experience, of several years in making brick, to a class of readers, who, from the active interest they take in all branches of claywork and especially the drying question, are no doubt sharp critics.

When favorable results are obtained from practical operations, occasion for much explanation is very satisfactorily avoided and mere references to facts suffice; the continued profit from physical tests being deemed of more value to manufacturers than analytical tests or theoretical explanations of what may be desired, rather than that already realized.

How to "raise the wind" naturally commands the attention of those engaged in many pursuits; and I hope to interest those who are familiar with the old time means of drying out of doors, where the air is supplied in unstinted quantities, and the most of the brick yet seem to be dried by that means, and cheaper as well as better, it appears, than by the artificial means in general use, were it not that the brickmaking season is so limited and the best, quickest effects are obtained when most exposed to danger from sudden changes to which the elements are subjected.

An interchange of thought is deemed desirable—that of experience in favorable results seems especially so, and I am pleased to give some of mine, partially in return for some of the benefits derived from the liberal expressions of manufacturers in the CLAY-WORKER and the proceedings of the National Convention so faithfully chronicled.

To make the wind blow steadily in a given direction, within doors admitting of regular caring for the brick at all seasons, first appears to call for some simple economical way to put the air in motion. While recognizing the impor-

tance of heat in drying, I am inclined to regard air in motion as rather more influential; though in artificial dryers, generally, heat seems mostly depended upon, even at so high a temperature as to require iron or steel pallets, instead of those of the less costly and most effective, it may seem to many, wooden means on which to dry brick.

We are all aware that March winds dry the clayey roads—and brick—very quickly and well at low temperatures, in which wood would not be thought of being in danger from firing. Of course, heat is known to enable the air to carry more moisture, but indoor drying generally appears to confine the moisture to such an extent as to require much heat for loading the atmosphere so confined, but if it "be passed along" rapidly and out, place will be made for air in dryer condition, capable of carrying more moisture, and when expelled at the lower temperature there is not so great a loss of heat. An abundant supply of quite dry air, though not so highly heated, seems to more closely describe the condition of the spring winds to dry quickly, rather than the warm summer air with but little motion.

Several years ago I observed in a mechanical paper certain tests made with a wheel on the plan of a boy's "cross sticks" wind mill. A wheel was placed close to a circular opening of about 24 inches or less in diameter, the air was drawn through the opening, the blades of the wheel extending about an inch beyond the edge of this opening, and it was found that a belt one inch in width was able to perform the work that formerly required a three inch belt—to drive a shaving from a wheel.

For the purpose of creating a concentrated current, such as a forced blast, the latter form of fan wheel may be even more desirable. But to move large bodies of air, make the wind blow—"Raise the Wind"—at about one-third the expenditure of power or fuel, this propeller fan, or "volume" wheel seems to be more desirable.

It has since been claimed that a volume wheel will put more air in motion than a shaving fan blower wheel can at four times the amount of power expended, but be this it may, the "volume" fan evidently moves air much easier.

Having selected the kind of motor that we deem desirable—let us now endeavor to place it "where it will do the most good. Where a wheel is

placed at the end of a dryer to exhaust the air, substituting a chimney, it may be; much air is observed to be thrown to waste, and this represents about all the air taken in the dryer, including the leakage, and thus the current is given away. With the air forced into a dryer, the air current going to the wheel is about lost. If we place a "volume" fan wheel at the end of the dryer say 12 feet long—make the wheel about 4 feet in diameter—(these proportions correspond with tests I have seen in operation); the dryer being about 5 feet high and 4½ feet wide; the lower half of the wheel being near the floor, and its diameter thus reaching nearly across the dryer. Very fair effects will seem to be exerted on the bricks or material placed within such a dryer as the wheels are ordinarily applied; but let us advance a step further.

Should about sixteen feet more in length be added to, and directly in line with the 12 feet already noted making the dryer about 28 feet long, with the wheel drawing the air through 12 feet and forcing it 16 feet, you may fairly expect this one wheel to thus exert about the same air "fanning" influences as two fans ordinarily placed; viz., one to exhaust through twelve feet, and another to force through 16 feet; and thus we seem to have entered into the preliminary consideration of handling the air from placing a fan or fans within a dryer where the air appears to be put in motion at small proportionate cost of power, the wind raised, at a little cost, and caused to blow steadily at all seasons, and under cover from storms.

"STUDY figgers, my boy, study figgers; learn how to calculate for yourself, else, otherwise, you'll often be cheated," said the doting father to his son just starting to school. There are more things than "figgers" to be studied in order to escape being cheated. Study character, and do it as patiently and carefully as you would calculate the value of a kiln of bricks, and study it for yourself with the best possible help from others, and you will often be surprised to find much good where you had been led to look for none. You need not be in a great hurry to come to a conclusion, and especially in publishing your conclusion. Sometimes it may be well to keep that to yourself entirely. But study character for yourself "else otherwise you'll often be cheated." Look for something good and you will often find it.

Written for the Clay-Worker.

BRICK AS A BUILDING MATERIAL AND THE TRUE ART OF LAYING THEM.

BY J. W. CRARY, SR.

BRICKLAYING is a peculiar art. The *trowel*, is one of the very oldest of mechanical tools, and is by all odds, the most difficult to handle with perfect expertness. Not one bricklayer in six can use a trowel with perfect skill. In order to be a first class bricklayer, the use of the trowel must be commenced in boyhood. The boy must have a natural mechanical talent, and a particular liking for the trowel, so that to handle and play in mortar with a trowel, as a matter of diversion, as well as art, is a choice pleasure.

There is a peculiar dexterity in taking mortar up from the mortar-board, and then spreading it skillfully on the wall, so as to make a perfect, regular "bed" for the brick. To do this cleanly and nice, without wasting mortar, is a rare art. The mortar should be so spread that the brick, when down to the "*line*," will have a perfect, even bearing, without "*flushing*" much mortar out, back, or front. Mortar should not be spread for more than six to seven brick at a time, then the brick should be wet and laid with a peculiar *shake* and pressure of the left hand, so that they will come down very near the *line*, and only a tap of the trowel is needed to adjust them right to the line after they are laid. I need not say, that brick should be laid plumb and level, though some good front workmen will "*hack*" the joints a little above the first story front, that is, to incline the front of the brick a little over, so that presents more "*face*" when seen from it below. Some contend that a front brick should be laid a little out at the bottom where the wall is seen below the eye, and a little out at top, when viewed above the eye. The old technical name for these differences is "*liping*" and "*hacking*;" the top of the brick is cut over, and the bottom under, which gives the joint a lip-like appearance. The object is to prevent the show of defects in perpendicular lines, under different views of light and shade. It is a matter of no great importance; it is simply a small draft and principle in favor of beauty, for no scientific builder will say that a brick is laid wrong when its front is

plumb, and its bed joint level. The objection to a "lip" joint is that it catches rain, dirt and dust. The smoother the front of a wall, the longer it will retain its freshness and beauty.

There are five other tools than the trowel, that belong to the bricklayer, viz., the "Scutch," the "Hammer," the "Chisel," the "Plumb" and the "Level." These, with the trowel, constitute the bricklayer's "kit" of tools, and, although few and simple, the man that has mastered a perfect knowledge and use of them is a first class mechanic.

TO GET AND START A GOOD FOUNDATION
FOR A WALL.

If it were not for the fact, that brick,

places of the country, where this was the case.

There are four general kinds of surfaces to build on, viz., sand or gravel, clay, stone and mud or alluvial soil, such as found in New Orleans. In building on sandy land, if it be level, the trenches for foundation should be deep enough to be below the frost, and all loose, unpacked earth or vegetable matter; then, before brick are laid, the foundation should be thoroughly rammed, so that all inequalities in the looseness of the sand will be equalized; then, the surface being leveled, the best hard brick should be laid and first course well settled. It should never be forgotten by

the bricklayer that it is the first bottom course of brick that he must depend on for a good foundation, and that one good heavy stroke in setting the brick as he lays them in the first course, is of more importance than all the nice care he can take in his wall above the bottom course. If the surface of the ground is unlevel or a hillside then the trenches for foundations should be dug out the same depth from the inclined surface. This leaves *steps* or *offsets* at the bottom at proper intervals, according to the incline plane of the surface. It is not infrequently the case where buildings are put up on a hillside to see one part of the foundation started near the surface and other parts at considerable depth below. This shows a want of ability or honesty in the builder or architect. Still a great deal of this kind of botchery is done everywhere, by common builders.

What I have said of sandy foundations will apply to clay, and to rock, where the entire

surface is rock, but if one part be rock and other parts be of other kinds of material, then, after proper excavation, a heavy body of concrete well rammed, or else piling, if in a wet place, is necessary in order to equalize resistance to pressure. It does not follow that the foundation anywhere shall be as solid as the rocky part of it, but it must be known that the weakest part of the foundation will much more than resist any pressure that the superstructure or needed weight would amount to. Any skillful builder can make this test. It is simply to find what a given surface of the foundation will resist and how much would ever be put on it



WM. H. WEST, BRICK MANUFACTURER, WASHINGTON, D. C.

when properly laid form the strongest wall known to builders; the careless, and generally ignorant attention given to foundations, would cause most all walls to crack vertically. Foundations are the main essential in building, and if the principle art is not well understood and strictly applied in all cases, the whole superstructure is imperfect and unreliable. I have seen large and costly buildings made comparatively worthless by negligence or ignorance in preparing the foundation. When walls crack or settle, it is necessary for the architect or engineer to invent an excuse, and the fault will often be laid on the brick, or bricklayer. I could name some prominent public buildings in different

HOW TO BUILD A FOUNDATION ON ALLUVIAL SOIL OR MUD.

New Orleans is the principal place in the United States where buildings must be on soft alluvial soil, and as it is not generally known how foundations are laid there, and as I have had much personal experience in doing brick work there, I will give a short description of such work. A trench is made of suitable width and deep enough to find water, then plank is put down lengthwise with foundation, then crosswise, making two courses of plank, the water will cover the plank. Brick work, with cement mortar, is then started on the plank and the work proceeds to completion. As the building progresses, and for two or three years after it is done, it settles until it comes to a bearing equal to the resistance of the mud and soil surrounding the plank foundation. The City Hall of New Orleans had settled, up to 1856, about sixteen inches. I saw that the use of plank as a foundation was a mistake, and instead I used concrete made of brick-bats, stone and coarse sand and cement, which was rammed down thoroughly, then starting the brick work with a broad base, at least three times the thickness of the wall proper, all settling of the walls was permanently prevented. The object in ramming a foundation is to adjust all inequalities. Some places will be soft, loose and spongy. All should be rammed until it ceases to settle.

I will close this series of articles in my next, showing how walls can be built strong and economically, and made dry inside, without expense of "furring."

PAVING BRICK.

Manufacturers of paving brick will find the little 48-page book entitled "Durability of Paving Brick" a very valuable aid in introducing brick in localities where, from lack of information, the value of brick as a paving material is questioned by those in authority. It is an authentic statement of the comparative merits of the principal paving materials and proves conclusively that brick is equal or superior to all others. It should be distributed generally by those interested in advancing the paving brick interests. Price of single copy 25 cents. Special rates will be made to manufacturers ordering large lots for distribution. Address the publishers, T. A. Randall & Co., Indianapolis, Ind.

BRICK PAVEMENTS.

THE first and most important requisite for a good pavement is a solid foundation.

Without this it is impossible to maintain a smooth surface, whether paved with "Granite Blocks," "Macadam," "Ashler," "Cedar Blocks," "Cobble Stones," "Gravel," "Asphalt" or "Bricks."

Next to importance to a firm and unyielding foundation is durability, smoothness of surface, and sure footing for horses.

In addition to these requirements a roadway should be constructed of such material, and in such a manner as to overcome any tendency to slipperiness, without joints large enough to encourage the growth of weeds, or the accumulation of filth, that will be least effected by heat and cold—that will be easily kept free from dust, and consequently free from mud, during the season when street sprinkling becomes a necessity, and withal costing so little as to come within the possibility of the smaller cities and larger suburban towns. In my judgement, these requirements are more nearly met where brick of suitable size and hardness are used in paving a street.

Brick pavements have attained such a degree of perfection, that I feel warranted in pronouncing them the best pavements now in use; and my experience leads me to add that the enduring qualities of a brick pavement are only excelled by granite, and are fully equal to that of Medina stone. A brick pavement properly made with such brick as are used in the city of Peoria, with the joints filled with distilled tar will be as smooth as asphalt, as noiseless as a new modern pavement, and will never become muddy. The brick paving blocks used in the Peoria pavement are of the following dimensions: "Four inches thick, twelve inches long and five inches deep; these laid in a bed of gravel five inches in thickness, thoroughly consolidated. The joints are filled in with coarse, sharp sand; the blocks being hand pressed are uniform in size; the upper edges are slightly chamfered, thereby furnishing the most perfect footing for horses."

Franklin street in the city of Peoria, to which I refer, has been paved about two years, and is one of the public

thoroughfares, and is subjected to very heavy traffic. As yet it shows no sign of wear, and is as smooth as an asphalt pavement.

There is no pavement in the State that presents a finer appearance than the one I refer to.

After many years experience in municipal work, I am willing to put myself on record, by saying, there is no better pavement known to the engineering fraternity than a properly constructed brick pavement that can be made for the same amount of money. It is simple in construction. It is easily, cheaply and quickly repaired. It is the smoothest, and most durable and economical pavement that can be laid, and from a sanitary standpoint is without objection.

In the selection of a material for the manufacture of brick for paving purposes, the properties of hardness and toughness are indispensable, only such material should be used as will burn to the consistency of flint, and yet retain all its powers of toughness. With such a brick as I have described a pavement can be made, having no inequalities of surface, and will present no resistance to heavy loads, and will reduce the concussion of all traffic to a minimum.

We have in brick pavements the combined good qualities of the "Granite Block," the "Macadam," the "Ashler," the "Cedar Block," the "Cobble Stone," the "Gravel," and the "Asphalt," without a single one of their objectional features, and, this too, at a cost only a trifle in advance of the cheapest pavement named.

In the city of Hague, Rotterdam, and other large cities of Holland, brick, for a century, has been the only finished material used for paving. The streets of their principal cities are subjected to as heavy traffic as the streets of the largest cities of Europe.

During the last summer a friend of mine visited the city of Hague, a city of 150,000 inhabitation, and made a careful examination of the brick pavements on one of the principal streets. It was laid more than 25 years ago and was in perfect condition, giving but little evidence of wear during all these years.

It only remains for the brick manufacturers to produce the proper material, in order to create a universal demand for their wares. Some have accomplished this result, and their success is stimulating others in their efforts to secure the same end. Won-

Extracts from a paper read at the fourth annual meeting of the Illinois state society of Surveyors and Civil Engineers, at Bloomington, Ill., by Geo. F. Wightman, city engineer of Peoria.

derful progress has been accomplished in the manufacture of clay during the decade just past.

Basing our expectations upon past results, we are warranted in hoping for such success in the future, as will secure to us good, durable and cheap pavements.

"WHAT PROFITS A MAN IF HE MAKES ALL THE BRICK IN THE WORLD, AND LOSES HIS ONLY DOLLAR?"

Mr. President, and Gentlemen of this Convention:

YOUR worthy secretary, Mr. Gleason, made a request that I write a paper on the following subject:

"What profits a man if he makes all the brick in the world, and loses his only dollar?"

No one but Mr. Gleason could have thought of such a subject. Men do more in this, the 19th Century, for honor and place than for profit,—so with the man who makes all the brick in the world without profit, he must do it for the honor, the credit, the good fortune, the dignity, the delight, the happiness, the pleasure, and the gratification of having made all the bricks in the world; and this will more than compensate him for the loss of his only dollar.

There are fire brick plants dotted all over this land, from Maine to California. Some are located on the coast of Maine, others in the principal cities, on the salt marshes of New Jersey, in the valleys and on the hills and mountains of Pennsylvania, Maryland, Kentucky, West Virginia and Ohio,—on the plains and slopes of this great country,—all busy making brick, Making Bricks, MAKING BRICKS, and losing their only dollar.

Oh, tell me, ye waves that wash the rocky coast of Maine,
Oh, tell me, ye mosquitoes of the salt marshes of New Jersey,
Oh, tell me, ye hills and valleys of Pennsylvania and Maryland,
Oh, tell me, ye everlasting mountains of West Virginia and Kentucky,
Oh, tell me, ye Golden Gates of the Pacific Slope,
Oh, tell me, ye Brickmakers of this Convention,
What profits all these people making bricks and losing their only dollar?

In St. Louis, there is an over-production of fire brick. The brickmakers there are doing their best to induce the railroad companies to make them a

specially low rate on brick to the East, so that they can dump their surplus into Eastern States, and thereby enable them to continue making bricks and lose their only dollar.

Down on the old Ohio, they are losing more than their only dollar making fire brick. They are now turning their fire clay brick into street paving brick, and doing a rushing business; rumor is that they are making a dollar or two. Out amongst the mountains of Kentucky and West Virginia, they have to contend with a very peculiar feature of that locality, and that is, the wonderful attractiveness it has for fire brickmakers. This has become a source of great



ALBERT GLEASON, PRES. IVY CITY BRICK CO., WASHINGTON, D. C.

anxiety to those already in the business, so much so, that they are making great quantities of brick, and losing their only dollar, for fear someone else will enter into the business and make a dollar or two.

In the valleys and on the mountains of Pennsylvania and Maryland, the fire brickmakers pride themselves on their immense plants, and are always boasting of their great output. Here they make brick on so large a scale that they can sell below cost and make it up in quantity, thereby losing their only dollar.

The fire brickmakers of New York City and State are so well protected by

the McKinley bill that it enabled them to reduce their prices, so that they are now making bricks and losing their only dollar.

On the salt marshes of New Jersey, they are making fire brick of all grades, and in endless quantity. It is surprising how they exist among the mosquitoes, Lyles and Salamanders, large and small. Here they have fire brick berries,—a kind of berry that is found nowhere else,—and Valentines the whole year round, and all the mud you want in the spring of the year. Yet with all this, the brickmakers seem to be happy making brick and losing their only dollar.

In Jimi Blaine's State of Maine, the fire brickmakers have everything their own way. With the aid of Winslow's Soothing Syrup, and Yankee tact, they are making brick and not losing their only dollar.

This is a great and glorious country, but it looks as if there had a cog slipped, when the fire brickmakers in it are making all the fire brick and losing their only dollar. Again, Gentlemen of this Convention, what does it profit us if we make all the brick in the country and lose our only dollar? You will agree with me that the demand for fire brick the past year has been good, and that there is no large stock of brick on hands to-day, although, with a good demand, the price has gradually declined. A year ago, at our Convention, we recommended that each manufacturer should gradually advance prices. How much have we advanced? NONE! But we have lowered the price very much from that of a year ago. We have no brick, and we have no profit. We are not only lowering the prices, but we are degrading the high standard of our production to the level of an ordinary mud brick. Is it not high time for us to throw out the life line and rescue this fallen industry from its drowning condition, and elevate it to its proper position? The ordinary, common, pressed building brick, let it be made from any kind of mud, let its color be what it will, and the weight one-eighth less than fire brick, and it commands a much better price than fire brick.

Fire brick should stand at the head,

and rank above any other brick produced. Fire brick are made of more expensive clays,—it costs more to prepare the mixtures, takes more fuel to burn them, and it requires more material to make them than any other brick. The great manufacturing industries of the world are dependent on fire brick. They are, therefore, no mean production, and should command a price that would pay the manufacturers of them a respectable profit.

If fire brickmakers had taken precaution a year ago, and accepted the recommendation made them by this Association at their annual Convention last December, and gradually advanced prices, they would have made all the brick at a profit, and not lost their only dollar.

Paper read by Mr. O. O. Bowman, of Trenton, N. J., before the Annual Meeting of the National Association of Fire Brick Manufacturers Dec. 2nd—New York.

Written for the Clay-Worker.

THE FUEL QUESTION

No 14

ATMOSPHERIC INFLUENCE, ETC.

DEAR WILL: In the CLAY-WORKER for January I gave you the composition of the atmosphere, that is, so far as pertains to the oxygen and nitrogen, which two gases are mainly the constituents of what we call "common air," or the atmosphere by which we are surrounded. I wish now to direct your attention to some other gases that enter into its composition in very small quantities, which, nevertheless, play very large and important parts; these are carbonic acid, ammonia and vapor of water. At present I shall only deal with vapor of water in the atmosphere; this is sometimes called moisture and humidity. Now, what I want you to understand by a moist or humid atmosphere is, perhaps, not quite in line with your ideas of such an atmosphere. On a damp foggy morning, when you cannot see half a block ahead of you, and when this *visible* moisture dampens you from head to foot, you would most likely call it a very moist atmosphere, as many people do, and thus fall into a very common error. Rain, fog, dew, snow, hail, etc., are all deposits of moisture given off by the atmosphere under conditions of temperature which I will now endeavor to explain to you. Our atmosphere then exerts a wonderful influence on everything on the face of the

earth, we will, however, confine ourselves to its influence on water and to the qualities bestowed on it by water.

It has been found that air has the power of absorbing and retaining from half a grain to twenty grains of water in each cubic foot within the bounds of ordinary common temperature. The following table is given by Prof. Silliman, and shows the amount of moisture a cubic foot of air is capable of absorbing at different temperatures:

Temp. Fahr.	Weight in Grains	Approx. Val.
0°	0.545	0.6
10°	0.841	0.9
20°	1.298	1.3
30°	1.969	2.0
40°	2.862	2.9
50°	4.089	4.1
60°	5.756	5.8
70°	7.992	8.0
80°	10.949	11.0
90°	14.810	15.0
100°	19.790	20.0

When the atmosphere has absorbed all that it is capable of absorbing at any given temperature, it is said to be *saturated*, and if its temperature be then lowered moisture will be precipitated and this precipitation will manifest itself either as clouds, dew, fog, rain, sleet, hail or snow.

From every river, pond, lake, sea and ocean there is continually arising at all known temperatures an invisible vapor, which diffuses itself through the air and is carried away by the wind or motion of the air, and remaining a component of such air until it—the air—comes in contact with colder air and gets chilled, then the clear atmosphere begins to cloud up, and if the chilling occurs to any great extent a downfall of rain, sleet, hail or snow is inevitable. For instance, if the air in your neighborhood is at 80° F. and saturated with moisture, and by some means gets cooled down to 70°, every cubic foot would deposit about three grains of its moisture, and if this cooling extended to a height of 500 feet, there would be rain to the extent of about one third of a pint on each square foot of earth surface.

I want you to pay special attention to this part, as it is an important factor in every-day work connected with drying and evaporation; and always bear in mind, too, that *evaporation cannot proceed after the air is completely saturated*.

Air is practically dry at 0° F., by this I mean it cannot be otherwise than practically dry. For rapid drying and evaporation it is essential that the air should be in brisk motion. Air not in motion soon becomes saturated when in the

neighborhood of moisture, and then, as I have just told you, evaporation ceases. This is a point often overlooked by practical men; yet every washerwoman knows that the clothes dry quickest on a windy day, and that a calm still day—even if it be very warm—scarcely dries the clothes at all. She may not know the philosophical reason of this, but she is well aware of the fact. I have seen dryers in brickyards where this fact was either ignored or unknown; and yet, where is the brickmaker who does not know that sun-dried bricks—like the washerwoman's clothes—dry quickest on a windy day?

It may afford you some satisfaction to speculate on the state of the atmosphere by watching the smoke stacks of locomotives and the exhaust pipes of stationary engines, for if the steam cloud ejected dissolves quickly in the air you may conclude that the air is somewhat dry and not near the point of saturation; whereas, if the steam cloud lingers and rolls about like a huge white cloud you may rely on it that the air is nearing its saturating point and absorbs very feebly. I have seen locomotives of passenger trains leave a train of steam cloud nearly half a mile long, and again I have seen it absorbed by the atmosphere so quickly as to be in doubt whether the steam was on or off. The long train of steam cloud will be seen mostly in winter or during cold weather, and the scarcely perceptible cloud on warm dry days.

Careful observation and thinking well over such phenomena gives us the key to the conditions on which depend drying, evaporation, and the precipitation of rain, snow, hail, etc., and knowing well this theory, and seeing it demonstrated daily, puts the scientific man on his guard against such absurdities as "rainmaking." Dyrenforth's theory and experiments to precipitate rain by *noise*, brings down on his head showers of criticism and ridicule quite as dampening as the rain he makes.

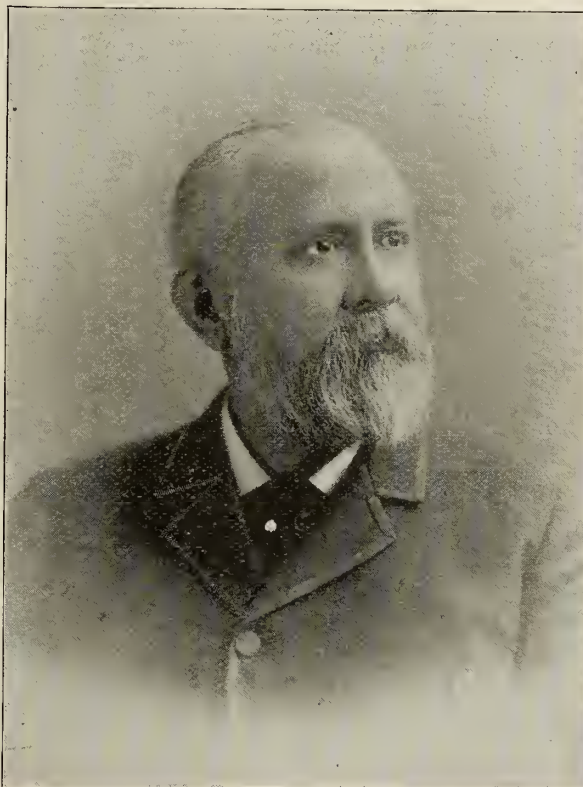
Now let us get back to the practical application of the theory of temperature and motion of the air for brick drying, and, in fact, for evaporation of any kind. I stated above that at some brickyards this theory was either ignored or unknown, because I have gone through dryers where there was no provision made to exhaust or expel the saturated air, the consequence of which was the dryer was constantly full of it, and the whole phenomena of rain and re-evaporation was in full swing on a small

scale, and the furnaces furnishing the heat were called upon to do double duty to a great extent by evaporating some of the moisture over and over again, wasting both fuel and time, which might so easily be avoided by attaching a small exhaust fan to the dryer, and having sides of said dryer so enclosed that the draft of the air would be from one end to the other. Malt is dried in this self-same way, except that the air passes through a bed of moist malt and absorbs moisture on its passage, moreover, the air is heated by passing it over a coke fire previous to its being sent through the malt; this you will readily see is to increase its capacity for moisture. By referring again to the table given above you will see that by heating air from 60° to 100° F. you will increase its capacity for moisture more than three times; its point of saturation at 60° being slightly over 5½ grains to the cubic foot, while at 100° it is over 19½ grains. These are facts well established and of the utmost importance to the young progressive brickmaker, not to the brickmaker only, but to every young man who aspires to an acquaintance with the laws and processes of nature.

The satisfaction does not end in simply possessing a knowledge of these things—yet even to know them is a treasure in itself—but it swells the pocketbook of thousands when they judiciously take advantage of such facts and put them into daily practice. Not long ago I saw a very beautiful example of this, for which—if I am rightly informed—a Cincinnati chemist named Lloyd has obtained a patent. It is an evaporating pan or apparatus for glucose, sugar and other factories where evaporation is carried out on a large scale, and consists in letting the liquid to be evaporated—such as thin syrups with an excess of water in them—to run down circuitous channels in which is sufficient space over the liquid for a stream of hot air, which flows in the opposite direction of the liquid and absorbs the water from the syrup as it goes along, until at the delivery end of the apparatus the syrup is found to be of the density required. I ought to tell you that the syrup enters the apparatus hot and is kept so by steam flowing in a channel underneath the syrup all through the apparatus. The air is

heated and forced through with a fan, thus we have at one end of the apparatus thin watery syrup going in, and just above it a cloud of moisture coming out, at the other end a thick, dense liquid flowing out, and a stream of hot air being blown in.

How closely the above apparatus resembles a well arranged steam brick dryer. And what do all these beautiful adaptations amount when viewed closely? They amount to small copies of nature's plans, the results of which were manifest to the washerwoman of time out of mind; there is, however, an abundant field left untouched for the earnest and painstaking enquirer.



CHAS. B. PEARSON, PRES. VIRGINIA BRICK CO., WASHINGTON, D. C.

I trust you now fully see the importance of motion as well as temperature of the atmosphere in all kinds of drying and evaporation, and always remember how necessary it is to remove the saturated air from the drying room to prevent the precipitation of the moisture already evaporated. The removal of the moisture-laden atmosphere requires looking after as well as the generating of heat.

I must now draw your attention to the familiar manifestations of both a dry and a moist atmosphere which you have no doubt observed many a time, but which you probably never troubled

yourself to understand further than the popular but erroneous impression about it. I refer to the dew which you have seen settle on the outside of a pitcher or glass of ice water, commonly known as "sweating," and supposed by many people to come through the pores in the pottery or glass. Well, let me inform you that it is not so. The moisture is produced there just in the same manner as rain is formed in the atmosphere above us; it is a case of chilling the air below its point of saturation, but, mind you, the chilling and consequent precipitation in this instance only takes place in the vicinity of the vessel of ice water. You have frequently heard the

remark, no doubt, "It's a sign of rain." This may or may not be so, depending entirely on the atmosphere above being chilled, or made warmer; in the first case it will rain, but in the next it will not; on the contrary the air will have its capacity for moisture increased. You may, however, feel quite certain of a copious downfall of rain, if the air above gets cooled down to the temperature of the pitcher of ice water which we will assume "sweats" and trickles down the sides of the pitcher plentifully, and you may as safely conclude that the atmosphere is moderately dry when the pitcher does not sweat at all, or only to the extent of a very thin film of dew.

You have frequently observed that fires burn much brighter in frosty than in warm weather. Now look above at your table and see how much moisture will saturate the air at 32° F.; you will find it cannot hold more than about two grains to the cubic foot; mind you, temperature is not an indication of how much it *does* contain, but how much it *can* contain and will absorb, if brought in contact with water.

Now, you will have no difficulty in seeing why a fire burns better in frosty weather than during the hot, sultry weather, and you will, for the same reason, understand why the breathing frosty air is so invigorating, and the hot "muggy" weather, as it is called, is so stifling and depressing. The comparatively large quantity of moisture or humidity is held responsible for defective combustion and difficulty in breathing in hot weather, while a dry atmosphere accounts for vigorous burning and

breathing. I shall have more to say on this subject in my next letter, and I must also leave the consideration of atmospheric pressure and its influence to my next; trusting you will perceive that, in all the changes and phenomena mentioned above, *heat is the prime factor.*

Yours Paternally,
HYDRO CARBON.

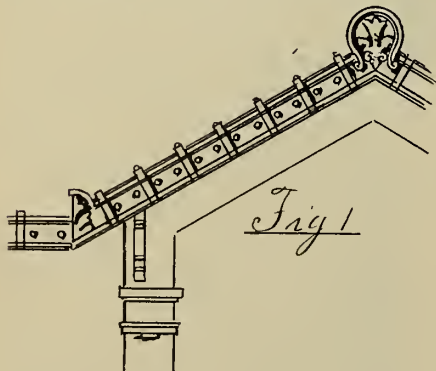
Written for the Clay-Worker.

ROOFING TILES.

Seventh Paper.

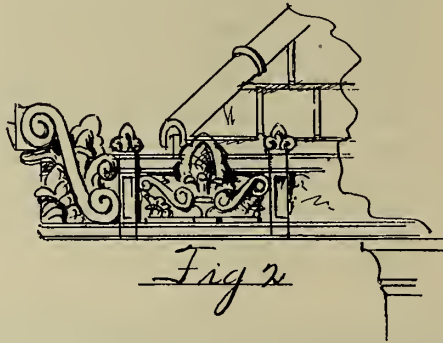
ENGLAND excels France in the manufacture of glazed and enameled brick and the higher grades of floor and decorative tiling. However, France manufactures a superior tile and other claywork for the covering and decoration of roofs. We have seen, in a previous article on the subject of roof tiling, the progress and development of that covering. We have investigated its history and shown its progress to the present day. Not only have these tiles had this long period of history, but this material has had very great use during all that time. In France there are more modern buildings covered with tiling at this time than with any other material.

I herewith illustrate two forms of decorative cutter moldings and cable tilings. This tiling is placed on the outside of rafter cornices, and covers and protects all wood work. A brick house with a wood or galvanized iron cornice is altogether an inconsistent and unworthy bit of architecture. The wood of the cornice is not at all in character with the brick of the wall of



the house. Wood in this connection and especially with wooden rafters and wooden gutter moldings show, in a very unworthy way, in connection with the solidity of the brick work and the dignity and character of the general structure. One sees these clay cornices

and gable finishers all over France. Of course, they are in varying patterns. Fig. 1 is a plain pattern, and is somewhat less decorative than Fig. 2. They are of pressed clay, thoroughly burned and nailed to the projecting wood work in a way to cover and protect it. It



shows one-half of the rake of the gable, and the bit of gutter molding running off in a horizontal direction at one side. Fig. 2 shows the corner of a gutter molding. This molding can be readily adapted for gable moldings of any pitch or general form. There would merely be necessary a slight change in the finish of the rafter foot.

Sometimes the rafter foot is made as per design No. 4, so that the same foot and head can be used for any pitch of rafter. Fig. 1 would have to have different kinds of rafter feet and finials for the point of the gable for different pitches, which would not be true of design No. 4. Here, no matter what the general character, the same pattern would do. It would do as well for a sixty degree pitch as for one of forty or forty-five degree. The ornament "B" at the point of the gable, which is shown to the centre line only, giving one-half of the pattern, can be placed over the joint in a way to hide it, and thus make this gable finish inter-changeable under all conditions. With only slight modifications it is easy to see that Fig. 2 could be adjusted in the same way. These gables may not only be applied to the finish of gable ends of buildings or gable projections, but for dormers as well. By having a dormer covered with tiling, the angles protected by hip coping, and the gable part finished with the gable molding here shown, one would have a substantial and measurably fire proof dormer; one which is decorative and constructional at the same time.

The use of tiling in this way is one step in the direction of a higher grade of building. It is easy to understand

that wherever claywork goes it advances the general character of all building operations. Instead of flimsy wooden gables on what would otherwise be substantial brick houses we have substantial decorative tile coverings for gables and gutter projections, making structures of good character both in point of design and construction.

Good art and good architecture always call for good construction. Light and flimsy, wooden cornices, projecting wood gables without proper protection, cannot be said to be artistic. Anything of this temporary character, which is so out of harmony with the substantial qualities of brick work is fatal to all ideas of artistic excellence. When we have good construction it is simply a question of proper decoration to develop artistic excellence. In all building work you must regard the cost of the structure, bearing in mind at the same time that any building, however cheap, however little money is used in its construction, can be made artistic if the designer has a proper artistic idea. Good proportions cost no more money than bad proportions; pleasing forms cost no more money than ugly forms, involving the same amount of material and labor. All we have to do in order to have a true art is to use these pleasing forms in material which will be substantial and lasting. Thus it is that it is altogether a worthy undertaking to produce a material for the protection and decoration of many brick structures which are damaged both constructively and from an artistic standpoint by the use of temporary material.



Most of the patterns which are used for the gutters, gable moldings and decorations which I illustrate can be pressed out on a machine of the same general character as that used in making roofing tile and certain forms of pressed brick. Fig. 3 shows the joint. It is a simple, light joint, and is made at the upright rib of the tile covering. The manufacture of this material makes another outlet for clay products.

Through the manufacture of tile roofing, glazed and enameled brick, to say nothing about general terra cotta work, the field of the clayworker is enlarged. Through an increase of products competition is reduced. The clayworker has something else to do besides the mere manufacture of brick. He is enabled to widen his field and give the community something else than ordinary building brick, where because of the number of manufacturers, and the rapidity with which they may be manufactured, there is a tendency to glut the market. With an enlarged field, with a wider range of products for manufacture, the general business of the clayworker is improved.

The clay gutter and gable finish is a new thing in America, and needs only a start to make it exceedingly popular. It is one of those things which tickle the eye, thus attracting attention in a way to lead to its general and rapid introduction. It is to be hoped that a short time will see many Americans manufacturing this material.

LOUIS H. GIBSON.

Paris, Oct. 25th, 1891.

CHICAGO ON A CRUST OF CLAY.

"Under existing conditions," said Gen. Fitz-Simons, of Chicago, to a *Tribune* interviewer in that city, "I would not invest a cent in one of those tall office buildings being erected down town. Chicago is now confronted with a very serious problem. While I am not an alarmist I must say that a grave danger exists from the big buildings.

"Chicago is practically afloat.

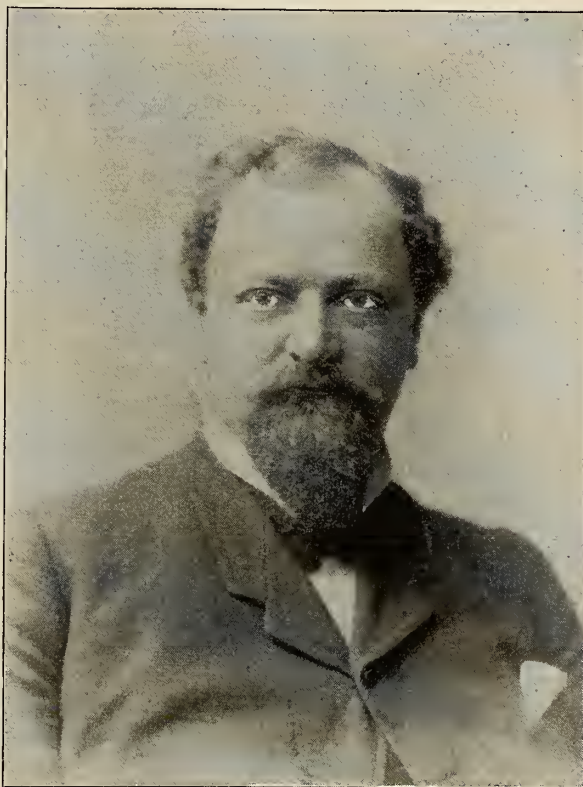
We are resting upon a semi-fluid mass which is covered by a crust only sixteen feet thick. The pressure of the tall buildings upon this semi-fluid mass has a tendency to force this substance up on either side. It's just like placing a brick in a pan of dough. The brick sinks down and the dough rises up on all sides of it. The same thing must happen with the buildings. As I said before, the crust, which is of tough clay is sixteen feet thick. Beneath this there is a soft substance, which is almost a fluid. It is from thirty to thirty-six feet thick, resting upon a stratum of indurated clay, directly underneath which is the hardpan. Now, as long as

the crust remains intact we are all right; but break the crust and the most disastrous results would follow."

PLEADING THE BABY ACT.

When a fast young man goes in debt for something he did not need, and then refuses to pay because a debt contracted by a minor cannot be collected at law, he is said to plead the baby act.

When a man who is too old to work and wants to make a pile in his old age, by becoming agent for a patent churn that is to cost him two dollars and which he is to sell for ten, but which he does not sell, refuses to pay the note he



THEO. L. HOLBROOK, PRESIDENT AND GENERAL MANAGER OF WASHINGTON BRICK MACHINE CO., WASHINGTON, D. C.

gave for this invaluable invention; he pleads the baby act.

When a heedless girl becomes enamored with a gay adventure in fine cloth, and hastens to marry him; then hastens to get a divorce because he proves to be a scamp, she pleads the baby act.

When a local politician who carries a torch and marches with the procession, and makes himself hoarse in favor of a candidate, then goes back on his party because he did not get an office, he pleads the baby act.

When a man loses spot cash in dealing in futures and then sues his partner in the crime to recover what he lost, he pleads the baby act.

Moral: Better not act the baby. Don't deal in patent rights that are to make you rich at somebody's expense; don't marry fine clothes, or fine eyes don't fool away your time in political parades; and don't try speculate in wheat or anything else. Go slow, and you will get there all the sooner.

PAVING BRICK.

Cloverport, Ky., may now be said to have started and proved successful, an industry which cannot fail to be of advantage to a town which hitherto stood in a comparatively inactive condition. For this new industry it is indebted to the McCrackens, of the Louisville, St. Louis & Texas Railroad discovering along their line of railroad large hills, apparently worthless, and finding nothing on the top, sought by digging for what they might contain below the surface; result, the discovery of a shale, out of which is made a very superior paving brick. At the beginning this material was sent for trial to the Frey-Sheckler Co., Bucyrus, O., the celebrated brick machinery makers; afterwards, the test being satisfactory, a company was formed and works were erected at Cloverport for the manufacture of paving brick, plans of which were formulated by the Frey-Sheckler Co. and Mr. Alfred Morgan, of well known repute as a brick works expert and engineer.

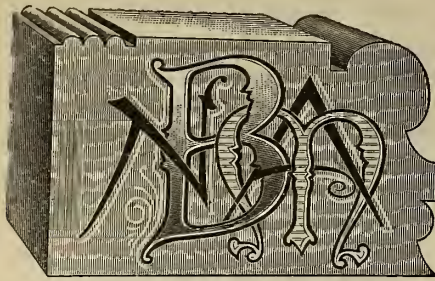
These plans were carried out by Mr. Morgan himself, and at Cloverport can now be seen a works that, for convenience and orderly arrangements, cannot be surpassed, as affirmed by several practical gentlemen from different parts of the United States who have visited

Cloverport, which is now become a center of attraction to those who are wanting to get into the paving brick business. In the early spring two other plants will be started. We learn further that this boom for Cloverport has started others upon the same lines in other parts of the State, as well as upon the adjoining line of Indiana. A further and more detailed account of these works may be looked for in a future issue.

VERAX.

The hands that rock the cradle
Move the world to do what's done.
But the hands that wield the shingle
Are the hands that move the son.

—New York Herald.



OFFICIAL ANNOUNCEMENT

Sixth Annual Meeting of the National
Brick Manufacturers' Association,
to be held at Washington, D C.,
January 12 to 16, 1892.

To the Members of the N. B. M. A.:

GENTLEMEN—As heretofore announced, our sixth annual convention will be held at Washington, D. C., beginning Tuesday, January 12, 1892, and continuing the balance of the week.

THE CONVENTION HALL.

The meetings will be held in the *Builders Exchange Hall* located on Thirteenth St., between G and H Streets. Visitors can have their mail addressed to them care Secretary N. B. M. A., Builders' Exchange, Washington, D. C.

HOTEL ACCOMMODATIONS.

The following are the Hotels selected for the accommodations of delegates, who are requested to announce to the clerk on registering that they are members of the N. B. M. A., as a uniform rate of \$3.00 per day will be made to delegates and those accompanying them:

Willard's Hotel, corner 14th and F Streets, North West, may be reached from B. & O. Depot by Street-cars passing both front and back of Hotel, and from Penn. Depot by Street-cars and Herdicks which pass main entrance. Regular rates, \$4.00 and up. Special to those attending Convention \$3.00.

The Riggs House, corner 15th and G Streets, N. W., reached from Penn. Depot by Street-cars which pass main entrance, and by Herdicks. From B. & O. Depot by Street-cars to 14th and G Streets. Regular rate \$4.00 and up. Special rate to delegates \$3.00.

The Ebbitt House, corner 14th and F Streets, N. W. The Metropolitan line of Street-cars from B. & O. Depot passes front entrance. The Penn. Avenue Street-car line and Herdicks from Penn. Depot pass the rear entrance. Regular rate, \$4.00 a day and upwards. Special rate during Convention \$3.00.

The General Headquarters will be Willard's, while those accompanied by

ladies are requested to stop at the Ebbitt House, across the street from Willard's, where special provision will be made for their comfort and entertainment. The proprietors of the Ebbitt House, also, request that those accompanied by ladies advise them in advance of their coming, in order that pleasant apartments may be reserved.

The Hotels are centrally located, convenient to Executive Mansion, War, Navy, State, Treasury, Patent, Pension and Post Office Departments, and the Convention Hall.

EXHIBITION HALL.

Arrangements have been made for an exhibition of brick, models of machinery, kilns, etc., in a large well lighted room, immediately beneath the Convention Hall. Craftsmen are requested to send specimen brick, either green or burned, or both, to Mr. Wm. C. Morrison, Chairman Exhibit Committee, Builders' Exchange Building. The article intended for exhibition should bear the name and address of the manufacturers and should be sent by Express, charges prepaid.

REDUCED RAILROAD RATES

Have been secured on the certificate plan over all lines composing the Trunk Line Association, The Central Traffic Association, The Southern Passenger Association and the New York and Boston Lines Passenger Committee, which include very nearly all the principal railways east of the Mississippi River. Delegates and their friends coming from beyond that line should purchase tickets to first station on east side of river, and then repurchase and secure certificate which will enable them to obtain the reduced rate from the latter point.

Each person desiring the excursion rate must purchase a first-class ticket and pay full fare to Washington, taking a printed certificate from the Ticket Agent, stating that ticket has been purchased at the regular rate. This when countersigned by the Corresponding Secretary will entitle the purchaser to a return ticket at one-third the regular fare, thus making a two-thirds fare for the round trip.

Should any ticket agent fail to have a blank certificate, a certificate or receipt for the amount paid, stating that it is for one first-class fare and bearing the agent's stamp should be taken, and will enable the Secretary of the Association to obtain the reduced rate returning, which cannot be done if proper receipt or certificate is not taken.

THE PROGRAMME

of the meetings so far arranged for is as follows:

FIRST SESSION, TUESDAY, 2:30 P. M.

Roll Call.

Enrollment of New Members.

President's Annual Address—J. C. Adams, Indianapolis Ind.

Report of Officers.

Election of Officers.

Installation of Officers.

1. Essay—"Brick and Tile Burning," R. M. Greer, Tuxpam, Mex.

2. "A Year's Lessons," General Discussion Led by Anthony Ittner, St. Louis, Mo.

Note: At the close of each address or essay, the subject under consideration will be fully discussed.

TUESDAY EVENING, 8:00 O'CLOCK.

Fourth Annual Pow-wow, under the auspices of the Washington Brick Manufacturers' Ass'n. will be held in the Convention Hall. B. H. Warner, Master of Ceremonies.

SECOND SESSION, WEDNESDAY, 9:30 A. M.

3. Address—"Use and Abuse of Brickmaking Machinery," W. K. Cunningham, Frankfort, Ind.

4. Essay—"Mixtures of Clay," Robert Lyle, Woodbridge, N. J.

5. "Making and Handling Front & Ornamental Brick," Discussion Led by Jas. H. Beggs, Wilmington, N. J.

Reports of Standing Committees.

THIRD SESSION, WEDNESDAY, 2:30 P. M.

6. Essay—"Brickmaking, Ancient and Modern," Thomas Moulding, Chicago, Ill.

7. Address—"Drying Brick," Ed. Callaway, Syracuse, N. Y.

8. Address—"Organizations of Brickmakers," Edwin McGraw, Pittsburgh, Pa.

9. "Profit and Loss in Brickmaking," Discussion Led by J. B. De Haven, Akron, O.

10. Question Box.

FOURTH SESSION, THURSDAY, 9 A. M.

11. Essay—"The Soft Clay Process,"

12. Address—"The Signs of the Times," J. A. Snell, Barrington, R. I.

13. Essay—"Paving Brick," G. H. Brown, Sioux City, Iowa.

14. Address—"Hand Vs. Machine Work," Jas. Dingee, Philadelphia, Pa.

15. "Does It Pay to Insure Against Casualties?" Discussion Led by J. C. Adams, Indianapolis, Ind.

16. Question Box.

FIFTH SESSION, THURSDAY, 2:30 P. M.

17. Essay—"Burning Brick," Wm. H. West, Washington, D. C.

18. "Some Essentials to Success in the Use of Oil as a Fuel," Discussion Led by—

19. Address—"Labor Troubles—How to Avoid Them," D. G. Harriman, New York, N. Y.

20. Question Box.

Reports of Committees.

Miscellaneous Business.

FRIDAY.

There will be a free excursion on the splendid iron steamer, "Macalister," to Mt. Vernon, the home and burial place of the immortal Washington. If the weather is propitious this will be a most enjoyable feature. Other side trips, such as a reception at the Executive Mansion and visits to the brickyards are contemplated.

Craftsmen desiring information as to the scope and purpose of the Association, requisites of membership or reports of previous conventions are requested to address the Corresponding Secretary, T. A. Randall, Indianapolis, Ind.

We urgently request all American brickmakers to identify themselves with us in the effort to stimulate progress and aid in the advancement of the entire craft.

Very Respectfully,

THE EXECUTIVE COMMITTEE.

J. C. ADAMS, President

T. A. RANDALL, Cor. Sec'y.

THE POWWOW.

Advice to Those Who Expect to Get There.



ELLOWS BRAVES, BRICKMAKING GENTLEMEN AND CLAY-WORKERS:—Were the Convention to be held in any other place than Washington, I, who know nothing about

brickmaking would not dare address you. But Washington is so pre-eminently a city where a man's knowledge of a subject is rather a drawback to him than otherwise (See Congressional Record), that I feel encouraged to speak to you as I might speak to a thousand younger brothers. Indeed, while I do not claim to be a past-master in the art of brickmaking I do know something of Washington. I can give you some good, wholesome, nay valuable advice—advice that you can deposit as collateral in any respectable bank in the country,

In the first place, when in Washington, beware of pick-pockets and do not lend your money to statesmen.



JOINT DEBATE—NOT ON THE PROGRAMME.

Avoid men who claim fellowship with you, because, in their time (while not doing time, but suckers), they have been more or less actively engaged in the gold-brick selling business. Do not let them successfully attempt a dry-pressed brick combination with you, on the

basis that you are dry and they pressed for money.

Do not take unto your council fire or even within the shadow of your tepee the man whose claim to fellowcraft is the fact that his nose is of a brick red hue or his neckwear of a color that could be truthfully described as Indian red.

And if you would avoid an appearance of verdancy let nothing induce you to go into the Department of Agriculture and ask Br'er Rusk for a dozen or so of the seeds of the brick plant.

Also, let me beg of you, closely listen to the charge I now make you: If by some gruesome accident a brick should



COMMITTEE ON FIRE-ESCAPES.

become concealed in your war bonnet take it out gently, being careful not to disturb the feathers, and deposit the brick with the clerk of the Wigwam-hotel, where you rest your weary scalp lock and feed your yawning face. That same clerk should be admonished to place said brick in the safe and give you a receipt therefor.

In Washington are many queer looking braves of strange tribes and odd habits; many wigwags of most unusual construction and quaint outdoor ornamentation. Do not try to enter all the latter or let the dwellers thereof lead you wheresoever they might will. Keep aloof from strange braves and bravesses.

Be careful, too, in experimenting with strange mixtures recommended as thirst quenchers, and unknown articles of food that may be offered you. Fill your-

selves, however, with the nectar of good companionship and the solid food of strong organization and smoke the incense laden pipe of harmony to your heart's content.

In conclusion, let me say that I will gladly give any and all of you introductions to my host of friends in Washington.



EMBLEMS OF THE TRADE.

They are all of them regular bricks, and mighty chiefs, everyone. They include: Hydro-Fobia-the-pug-mill-man, Bat-in-his-hat, Dog-faced-Charlie-the-half-breed, Blue-faced-paver, Big-foot-Kali, Man-afraid-of-the-dump-cars, Sewer Brick Jimmy, Kill Run the-way-off-bearer, and our old friend Stick-in-the-mud, who, I am afraid, will leave town when he hears of your coming.

CHAS. LEDERER.

Better Late Than Never.

Editor Clay-Worker:

Gentlemen:—Your letter calling attention to the fact that my subscription to the CLAY-WORKER has not been paid received. In reply, will say, I am sorry it has been unpaid this long, but as you see on the enclosed draft for \$5.00 dated June 13, 1891, I intended to remit last June, bought the draft and mislaid it, and forgot all about it until I got your letter, when I happened to find the draft put away in a drawer. Please give me credit for the enclosed and oblige. I enclose, also, herewith draft for \$2.50 for which please send me the book entitled "Brickmaking and Burning."

Hoping this will be satisfactory, I am

Yours Truly,

Willmar, Minn. JOHN DEHLBOM.

THE PRIME ESSENTIAL.

AN eminent writer in speaking of bricks says the essential qualities of good brick may be stated as follows:

First—Uniformity. Second—Regularity of shape. Third—Strength. Fourth—Its low price.

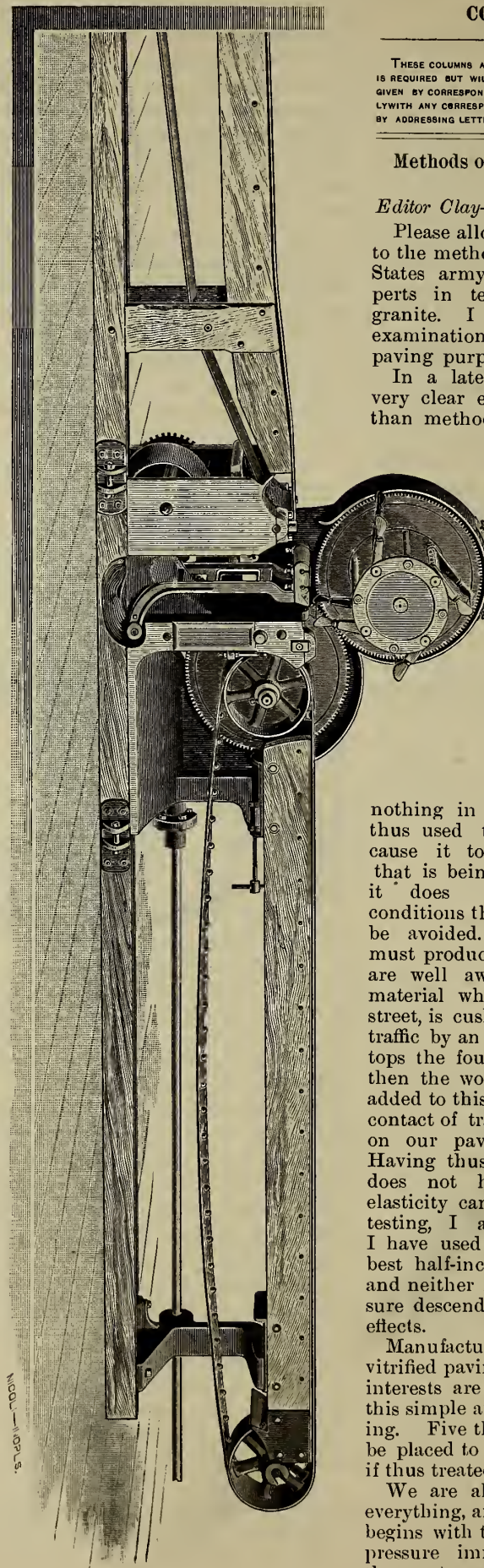
The first three requirements is obtained by using machinery that is properly constructed for expressing the clay through the die into bars, the latter is obtained by having simple and effective labor saving devices. We know of none that is more deserving especial mention for labor saving, and at the same time so simple and perfectly adjustable as to take up the wear by adjustment, and not composed of parts liable to break or excessive strain or wear, than the Cunningham's Automatic Table.

This table is thoroughly automatic as the bar of clay operates it entirely and is not driven or controlled by auxiliary belts as are all other automatic tables. This insures the cuts to be of equal length no matter how fast or slow the machine may be making brick—the capacity of the table is only limited by the capacity of the brick machine.

Another special feature of this table, and a great advantage, is the way the wires are mounted. They are on springs which hold them tight but will yield to foreign substances, such as stones, until the drop pallet goes forward with the severed brick, this makes an opening that lets the foreign matter drop below and gives room for the wire to come up without returning through the cut; this prevents the wires being broken; but should one break it can be easily replaced while the table is in operation. For testimonials from brick-makers who have used the Cunningham table write the manufacturers; The Wallace Manufacturing Co., Frankfort, Ind.; who make a complete line of stiff clay machinery, as our readers may see by referring to pages 573 and 585 of this journal.

A cynic is never so happy as when he is making somebody miserable. Just think of a lover of good eating filling himself with the combination of indigestible ingredients, which enter into a first-class pudding, and complimenting the cook by quoting the old psalm: "The proof of the pudding is in the eating of it;" only to hear a chronic growler say: "Not so. It's in the digesting of it."

THE CUNNINGHAM AUTOMATIC CUTTING TABLE—MANUFACTURED BY THE WALLACE MANUFACTURING COMPANY, FRANKFORT, IND.



CORRESPONDENCE.

THESE COLUMNS ARE OPEN TO ALL. THE FULL NAME AND ADDRESS IS REQUIRED BUT WILL NOT BE PUBLISHED EXCEPT WHEN PERMISSION IS GIVEN BY CORRESPONDENT. THOSE DESIRING TO COMMUNICATE PRIVATELY WITH ANY CORRESPONDENT WHOSE FULL NAME IS NOT GIVEN CAN DO SO BY ADDRESSING LETTERS CARE OF CLAY-WORKER.

Methods of Testing the Strength of Brick.

Editor Clay-Worker:

Please allow me to call your attention to the methods practiced by the United States Army Engineers and other experts in testing concrete brick and granite. I refer in particular to the examination of material designed for paving purposes.

In a late issue of a trade journal a very clear exposition of results, rather than methods of testing, is given. A

word and figure illustration from the *Watertown Arsenal* in Massachusetts.

It appears that they use an insulage of plaster of Paris to secure perfect contact; that is to say, a cushion of plaster serves, or is supposed to serve, the purpose of preventing any harmful effects from mechanical inaccuracies left on the surface of the material to be tested. With a respect born of a life-time regard for our army officers I yet have this to say; that there is

nothing in the nature of the plaster thus used to in any valuable sense cause it to resemble the material that is being tested. It must crumble; it does crumble, thus leaving conditions that were at first intended to be avoided. Unequalled influences must produce unscientific results. You are well aware that all fine paving material when in actual use on the street, is cushioned against the shock of traffic by an elastic bed of sand which tops the foundations; if this is not so then the work is improperly executed; added to this we find that the legitimate contact of traffic by animals or wheels on our pavements is always elastic. Having thus shown that nothing that does not have a certain degree of elasticity can be properly used at the testing, I am permitted to add that I have used with unusual success the best half-inch felt pad for the upper and neither face upon which the pressure descends with exact and natural effects.

Manufactures and users of annealed vitrified paving brick will find that their interests are particularly subserved by this simple and effective method of testing. Five thousand pounds extra will be placed to the credit of their material if thus treated.

We are all looking for the best in everything, and that superlative degree begins with the chemistry of the goods, pressure immediately following; fire, the great constructive agent comes next;

when the result will be accuracy in shape, non-absorption, toughness, superior sanitary conditions, long life and economy.

W. L. S. BAYLEY,
C. E. & M. E.

The Strength of Brick.

Editor Clay-Worker:

I enclose the results of a test of four brick, which I think will be interesting from the fact that the load carried by brick No. 1 surpasses that carried by any brick yet tested, so far as I can learn by correspondence with several parties.

The brick were all made from clay obtained in this vicinity by Mr. T. B. Campbell. They were made on an auger machine, No. 1 being repressed on a hand press, the others being ordinary brick. The difference between No. 2 and No. 3 was simply in the amount of burning, No. 2 being burned until it was partly vitrified. No. 4 was from the surface clay and burned red in color. Attention is particularly called to the fact, which I have often noticed in testing brick, that an over-burned or vitrified brick is likely to have less strength than a well burned one, that it is possible to make a poor grade of brick by either over-burning or under-burning.

All the brick were tested entire and on edge as they would be used for the purpose of paving. The sides were dressed to parallel planes on an emery wheel, so that the bearing should be uniform over every part. A single layer of thick paper was placed between the surfaces of the brick and the testing machine.

The following shows the results in tabular form:

The repressed brick exhibits, so far as the writer can determine, the greatest crushing strength of any brick on record; it is also superior in strength to sandstone, and fully four-fifths as strong as granite.

The tests of stone are usually made on cubes one or two inches on each edge, and such tests show a greater strength per square inch than would be the case if the form of the block was like that of the brick tested; so if the proper allowance for form could be made, there is little doubt but that the crushing strength of Brick No. 1 would compare favorably with the strongest granite.

The best results from ordinary pressed brick usually show a strength from 6,000 to 10,000 pounds per square inch, so that the other bricks tested, considering the quality and method of manufacture, show an extraordinary strength.

R. C. CARPENTER.

Opening Up a New Field.

Editor Clay-Worker:

Having been for several months a subscriber to your valuable paper, and receiving through its columns many profitable pointers in the way of showing us what our "go ahead" brethren in the clay business are doing, we thought you might like to hear how we are getting on.

Our plant at Socorro, New Mexico, is about completed, the machinery consisting of dry pan, wood frame, Acme brick machine, revolving screen, cutting tables, etc. The machinery was all sold us by the Frey-Sheckler Company, whose advertisement we saw in the CLAY-WORKER. We have several large

and valuable clay properties in the immediate vicinity, and our capacity at present is 20,000 per day. Our specialty will be fire brick and fire clay, but we propose, also, to make, in addition to fire brick, building brick, drain tile and such other clay ware as we can produce, and add from time to time. Our field of operation is a wide one, the demand at present being supplied from the East. This makes the price high, owing to the freight. We save this and have already made contracts with several of the large smelters for fire blocks, etc. Our capital is \$250,000, and we are in the business to stay.

THE SOCORRO FIRE CLAY Co.,
J. W. Monteith,
Secretary and Treasurer.

New York News.

Editor Clay-Worker:

There is no improvement to note in the brick trade here this month. It is time that a great many brick have been put on the market, but there was good reason for this action, namely, the annual fear that the close of navigation would find the market bare of material.

The demand has very nearly equalized the supply, with a small surplus left in the market every day sufficient to guarantee the advantages of the market in favor of the buyer. An unusually large amount of pale brick has come down the river, during the past fortnight, far in excess of the demand, and they have sold unusually cheap, in consequence—some of them as low as \$1.75 per thousand. The better price, though it must be explained, was for a very few inferior lots. The good quality was held at \$2.00, and as soon as the unusual influx ceased, recovered their tone and are now selling at from \$2.00 to \$2.50. Hard brick range in price from \$4.75 to \$5.50, while the Jersey brick men have advanced the prices of their output from \$4.50 to \$5.00.

BRIC-A-BRAC.

Respectfully Referred to "R. Brick" and "Tim Tinker."

Editor Clay-Worker:

I am looking the matter up with a view of putting in a plant this winter, to be ready for spring work. The plant will be small, but I want it first-class. Our clay will make a very good hand made, or slop brick. There is considerable demand for tile, if they could be got at a fair price, but we have to ship about 100 miles.

Considerable building is contemplated here, including a Court House and, perhaps, three or four, or more, new stores, besides the regular county trade.

Will you kindly send me a memo. of the machinery that will be necessary to start a good brick and tile yard with a capacity of, say, 10,000 to 15,000 brick per day of ten hours, and the probable expense of the entire plant ready to start, and what precautions will be

RESULTS OF TEST.

Name of Brick.	No. 1	No. 2	No. 3.	No. 4
Weight of Brick, lbs.	4.86	5.14	5.1	5.00
Dimensions	$7\frac{3}{4} \times 3\frac{5}{8} \times 2\frac{5}{16}$	$8 \times 3\frac{5}{8} \times 2\frac{5}{16}$	$8 \times 4 \times 2\frac{5}{16}$	$7\frac{3}{4} \times 3\frac{3}{4} \times 2\frac{5}{16}$ inches.
Cubic Contents	61.35	70.7	74.0	67.20 cu. in.
Area Strained	16.95	18.5	18.5	17.92 sq. in.
Height of Column	$3\frac{5}{8}$	$3\frac{7}{8}$	4	$3\frac{3}{4}$ inches.
TOTAL STRESS:				
First crack	208,000	84,000	56,000	48,000 pounds.
Splinters Fly	250,000		138,000	108,000 "
Crushed	254,000	172,000	180,000	141,200 "
STRESS PER Sq. INCH.				
First Crack	12,230	4,580	3,508	2,600 "
Splinters Fly	14,800		8,362	6,000 "
Crushed	14,990	9,300	10,909	7,880 "
Color of Brick	Light Cream.	Light Cream.	Light Cream.	Red.
Fracture	{ Hom'geneous Columnar.	{ Black Vitrified.	Homogeneous.	Homogeneous.
Position First Fracture	One Corner.	Central.	Central.	At One End.
Direction of Fracture.	Vertical.	Diagonal.	Vertical.	Vertical.
Kind of Brick	Repressed.	Common	Common.	Common-Top Soil
Specific Gravity	2.18	2.01	1.91	2.07
Wt. Per. Cu. Foot	136.9	125.6	118.8	129.0 Pounds.

Fracture conchoidal, slightly granular.

necessary to know if the clay will make tile. We know it will make a fire brick, as before stated, and, if so, why should it not make a corresponding quality of tile? P. L. HUNT.

Harlan, Iowa.

Gaseous Fuel.

Editor Clay-Worker:

Mr. Waplington concedes to me the privilege of a closing reply. As he has written eight columns, and I four and one half, there seems to be a margin of space in my favor. At last Mr. Waplington has given us data from which to calculate the saving by his method, if his figures are correct. He burned one thousand brick of 92 or 96 cubic inches each with seven-tenths of a ton of slack coal.

Mr. N. N. Pierce of Peoria, burned by some other method one thousand brick with eleven-fifteenths of a ton of coal; reduced to a common denominator Mr. W. uses one hundred and five one hundred and fiftieths and Mr. Pierce one hundred and ten one hundred and fiftieths of a ton. I don't know the size of Mr. Pierce's brick; our moulds are eight and three-fourths inches long, four inches wide and two and one half inches deep; capacity eighty-seven cubic inches and we burn with 263 pounds of coal per thousand brick. We could use bituminous slack alone if it was in our market but it is not known to the trade here.

It is useless to carry on discussion with a man who knows so many things that are not so. When this discussion commenced I had a firm belief that Mr. Waplington and Mr. Davis had taken a decided stand that converting coal into fuel gas was a great saving of fuel. He has argued about our great loss of heat in burning with coal, and now gives his whole case away in his statistics. And what a change from the serene suavity of his first communication, compared with the epithets in his last.

S. P. CRAFTS.

Business vs. Sentiment.

Editor Clay-Worker:

As the sixth Annual Convention of Brick Manufacturers' Association is approaching very rapidly, it is time that those who give thought to the Convention and its needs, should formulate in their minds such changes and reforms as may suggest themselves for the government of our meetings.

It was a pretty sentiment that first impelled our 'esteemed brethren to establish the precedent of electing as our presiding officer, one of the members of the craft in the city in which the Convention is held. As I said before, this is a sentiment, and sentiment is a good thing in literature, art, and the aesthetic, but when it comes to the manufacturing of brick, and the discussions thereof, we would profit by relegating sentiment to its proper sphere.

I have no fault to find with the men who have presided over our deliberations in the past. They have been grand, good men, and have been wisely selected for us, but the practice of having our chief officer selected for us by a few persons is wrong in principle and may work us injury in the future. Our presidents, ex-officers, become members of the executive committee. In their hands rests the future success or failure of our beloved Association. I desire to see the board made up of the vigorous, active, interested members of our craft; who have proven their loyalty in the past and whose devotion to our interests, is a guaranty of their future fidelity.

I do not care to go further into this subject, nor to take up further space in your esteemed journal; I only desire to say that I shall go to Washington prepared to urge for the presidency the best available man, be he from Washington, Boston, St. Louis or any other city.

Very Respectfully,
W. H. ALSIP.

An Iowa Brickmaker's Views.

Editor Clay-Worker:

As other people have something to say now and then as to what they are doing, may be some of your readers may be interested in a short description of our works.

We are situated at Riverside, Iowa, a beautiful little town of about one thousand. We are small fish, make one and one-half million brick a year but sell all we can make. We have a soft clay without any stones, and make side cut brick on one of H. Brewer & Co's No. 6 Machines, and dry them on iron cars in tunnels, which we heat with coal slack, and dry in 48 hours. We got up the tunnel ourselves and it works well. We make red building brick and burn them in an old-fashioned up-draft clamp kiln.

We study R. Brick's Hints and learn many things from them. We used to make the hand mould brick, and flop them all over the yard, but we have quit that method long since and would regret to have to go back to the old style again. In fact, we would not do it.

We are like a great many more that we hear talking—we take the CLAY-WORKER and could not nor would not do without it if it cost \$5.00 a year. It contains the opinions of many "long-headed" brickmakers, and advertisements of all machinery that it is necessary for us to know where to get, when we are in want of such things.

We just arrived home from a week's visit in Illinois looking through several large brick plants, and, in particular, that of the Purington Paving Brick Co., at Galesburgh, Ill., where we met Mr W. S. Purington, vice president and general manager of the works, and who is a perfect gentleman. He spared no pains in showing us about the works. One appreciates such kindness as this, especially when away from home. It,

also, shows the character of a man when he will notice and show attention to such small fry as we are, when we go to see such monumental works. Indeed, we think it was very clever of Mr. Purington. He was very busy, had a great deal of business to attend to, and yet he did not neglect to treat us white. Mr. A. A. Matteson, secretary and treasurer, whom we met, is also a very pleasant gentleman.

They have two Chambers Machines, two Chicago Dryers and 16 of Eudaly's kilns. They make 150,000 brick a day and there are no poor ones among them. They are all vitrified, perfect, No. 1 Pavers. They have a fine bank of shale clay and every thing was in ship-shape order.

Mr. Purington invited us to come again, and we certainly will be glad to do so when opportunity presents itself.

Fearing this will get tiresome to your readers, will close. Wish we could go to the convention, but it is a little too far away and we will wait until it is held nearer home. However, we will not be entirely deprived of the benefits, because, don't you know, we can read it all in the CLAY-WORKER.

Mr. Editor, please let us know when our subscription expires and we will remit \$2.00 for another year.

Yours Fraternally,
H. L. SWIFT & Co.

After the Machine Men.

Editor Clay-Worker:

I have read the advertisements in the CLAY-WORKER from the front page to the back, and am in such a bewildered state of mind that I can but compare the advertisers to a crowd of hotel porter's tackling a man from the rural districts as he alights from the train. Just stop and see how they blow and howl and cry down one another until the poor man turns away in disgust and goes away to find out, on his own hook, which is the biggest liar of the howling gang.

Now this man represents the machinery purchaser, or rather the prospective inquiring buyer, and the howling gang of porter's, the machinery manufacturers.

The man with a \$250.00 outfit has as big an ad. as the \$3,000.00 man and the \$250.00 man blows just as loud and long, and makes just the same guarantee and runs his competitors down just as hard as the \$3000.00 man, and vice versa. All I can say is shame on them! Of course, there are a number of good machines for every purchaser on the market, and this is a glorious big America, and lots of people in it, and room for all and no need of so much misrepresentation.

The outcome of this is a great detriment to the machinery builders, for all are compelled to make broader guarantees and to sell the machinery on long time trials, etc., while if there were less blowing and better and stronger

machinery made it would be better for all concerned.

Such proceedings cause the entire machinery fraternity to be looked upon with suspicion, causing more expense each year to sell their products, which of course, we have to pay when we purchase the machinery we must have.

The misrepresentation does not end in the trade journals, but must necessarily be carried out, or is an incentive to the traveling man to do so; still the employer of these men says he does not sanction or encourage his men to defame or lie about others machinery. May be so, but his flaming "ad." sets the example.

It is high time there was an end being put to this; let the machinery be sold on its merit only.

Why should not the machinery men form a more friendly and social relation, following the example of the Brick Manufacturers.

TIM TINKER.

In and About St Louis

Editor Clay-Worker:

The year amongst the brickmakers, up to September 1, promised to be the most prosperous ever known here, but, when prospects for a good fall trade were brightest, the bottom fell out of the market, and the makers were left with large stocks on their hands. Prices naturally decreased, and the loss this fall will nearly offset the summer's gains.

The season is now practically over in this section, one or two of the local yards, as well as those at Collinsville, Ill., having shut down. Some brick are being furnished on the large jobs, on which work will be done whenever the weather permits, and a few small ones.

The prospects for the spring trade, however, continue to grow brighter, and some very large jobs are being figured upon—notably the Rialto Building, and the Mercantile Club will also construct a handsome home as soon as the winter season is over. Plans are being drawn for a handsome ten-story building to be erected on the corner of Fourth and Olive streets, a valuable corner occupied by a few dilapidated buildings.

The tile and culvert people are at the tail end of their season, though they have had a very busy year of it, and for this time of the year are receiving a very satisfactory number of orders.

Terra cotta work continues to grow in popularity, and no building is now considered complete without its entering liberally into the construction. The demand has become fastidious, too, and the old stock designs are being superseded by the work of clever artists. The Winkle Terra Cotta Co., of this city, have been kept busy all year, and have their hands full yet in filling orders. This company have been favored with public work, as they are now supplying court houses at Fairfield, Ia., and Warsaw, Wis., in addition to the above and Government buildings at Texarkana,

Ark.; El Paso, Texas, and Monroe, La. They are also beginning a very handsome job on the Wainwright building, Seventh and Chestnut streets, here.

The Illinois Supply & Construction Co. people, the new competitors in this market, are highly elated over their prospects thus far and confident for the future. They will shortly place upon the market a new hydraulic press, invented by Mr. Henry Cooke. They gave it a trial recently and found its automatic action to be perfect. Improvements will be made in one or two minor particulars, and they state that they will then have a world beater. They are also pushing the kiln invented by W. P. Grath. They placed one in a yard at Newbern, Ill., where, with inferior fuel, they claim an average yield of 50 per cent. stock brick. Mr. Grath will go over in a few days to superintend the next burn.

Mr. J. Q. Adams, Birmingham, Mo., recently secured a patent on a dry press brick machine. Its point of difference from the other dry press machines is that the pressure is derived from three sets of toggles, one very large set and two small ones, the large set opening and closing the smaller sets by being pushed and pulled. By this method the inventor claims there is no loss of pressure, it all centering upon the brick while being pressed. He also claims a great economy in power required.

H. Stellern, proprietor of a yard at Ft. Madison, Iowa, visited St. Louis, November 28.

The Hydraulic Press Brick Co. have been rather unfortunate during the past month. On the evening of November 23 fire did \$750 damage, principally to machinery, and on the morning of the 3rd inst. a straw shed was burned with six carloads of straw. The damage at this fire was about \$1,500. Both fires occurred at the yards on Kings Highway and New Manchester road. The latter is attributed to tramps who had been making a bed-chamber of the straw house.

Mr. W. H. Graves, of the Hydraulic, has been on a visit to the Nation's Capital. It is supposed he fixed the "speaker-ship" question while there.

The latest acquisition to the ranks is the Monterey Brick Co., Hutchinson, Kas., capitalized at \$50,000.

"TERRA COTTA."

Weathering Clay.

Editor Clay-Worker:

Our benevolent friend contributes some very valuable information in his article in the November CLAY-WORKER on "Weathering Clay."

From practical experience I can state that this is the most valuable of all clay preparing customs. But allow me to describe it more fully. Suppose you have knappy clay or marl, put it through a grinding mill to the thickness of a silver dollar, and be sure to spread it no thicker than the frost will go through.

Run water over the top in troughs, and get an iron bar and put holes through to the floor or ground, and thoroughly soak it. Plastic clays do not need grinding, but be sure to get each course weathered and frozen before you put on another, and so on.

ALFRED YATES.

Items From up the Hudson.

Editor Clay-Worker:

No doubt many of your readers thought it a strange admission on my part in your last issue where I am made to say that the Haverstraw manufacturers had not made their usual complement by a "million," as it is a well known fact that the shortage was "millions." "Good" John Wannamaker's postal service is accused of many shortcomings. Possibly some of his clerks captured my s.

Before this reaches you, no doubt, all yards along the Hudson will have burned their last kiln. At Haverstraw, the Excelsior Co., moulded their last pit on the 5th of November, being the last to mould of the many yards located here. Last winter they made a contract for eleven million of brick at \$6.00 per M., delivered in New York. When it became known, manufacturers said: "Can it be possible for such a quantity of brick, and at such a low figure." Facts are stubborn realities and in this case the company is to be congratulated.

They have made a good rent for their material as well as keeping their vessels going, thereby earning a good percentage on their investment. I think that some member of the firm, or all of them, must be endowed with that "foresight" that "R. Brick" in one of his articles thought was necessary for a thorough brickmaker—"One that knows what is going to occur."

The Excelsior Company will expend about \$30,000 on improvements this winter. They have docked in a large area and are busy filling it in; will shift their sheds out so that eleven rows will hold a pit of brick of 22,000, where it now takes fifteen rows for the same number of brick. I hear some of your readers say: "How about the truckers?" They will "git thar," never fear.

About five minutes walk from this company's yard is a yard that for many years could mould but nine pits a week. The property passed into the hands of a man that was not a brick manufacturer. The first move he made was to lengthen the yard, so that they could run two machines a day. The yard held four hundred moulds long. When someone called his attention to the fact that truckers would not be able to keep in, he said: "You must educate them up to it," or in other words, educate them to run their legs off. All the same, the yard is leased for \$1.25 per M., compelled to make four million a year, or pay for them, and one quarters rent in advance. On the first of the year all brick made to be paid for, which would mean that

the lessee would in a season when it paid to run up to capacity, pay for all brick made over the quantity agreed upon in lease. By this arrangements, the lessor will have all his rent. The manufacturer has his brick under his shed which will take until next June to market.

I may here state that one of the proprietors of the yard told me that they would not make over three million this season, thereby making the land owner a present of \$1250.00, as he said it was better to pay that amount than make the other million and lose more.

As I look over your columns each month, and see the different machines and see the testimonials of merit by those who have used them, I look for, to us in this section, the familiar names of Ver Valen, Waldron and Wiles. Step into the first yard below the village and go from yard to yard, look at the front plate, and we will see no other name but one of the above. The name of Ver Valen so long and favorably known, will soon be unknown on brickyards, as advancing years have caused him to withdraw from business. His foundry has been dismantled.

About fifteen years ago, there was a company used, I think, a Chambers Machine. It was not a success. The brick would not stand the frost, and I believe the fault found with them in New York market was that they were so compact that the mortar would not adhere properly. The yards were in existence but a few years ago. To-day there is nothing but the "tub process" (soft mud) in use.

There are but three covered yards in Haverstraw, and I think, six pallet yards. There is not a tempering wheel in use. The last to use them was the firm of Wood & Keenan, who stand at the head as manufacturers of common, hard brick. They used to temper with horse power and wipe out with the same. They have put in steam and use soak pits, and their brick still retain their lead in the market.

There is one yard in Haverstraw that is built on ground where the clay was taken out and then filled in and a yard erected. In another case there was a yard discontinued, the clay taken out, filled in, and now a four-machine yard is occupying the site. The hole that was left was connected with the Hudson river by digging a canal about fifty feet long. If any of your readers should pass over the West Shore R. R., and will look down toward the river just below the village it is in plain sight.

In another case for forty years a piece of property laid idle because the clay had been used up, and the owner started to make a half mile track on the property; he died, and the property passed to his son-in-law. About six years ago, he thought he would bore the land; he found plenty of blue clay. The old yard had dug out the bottom clay for five or six feet, or just deep enough to take the screenings from the sand on

top, as the manufacturers of that day thought it would ruin them if they had to pump out a bank—a clay bank, I mean.

To-day all yards have their steam pumps in their banks.

Sand, sand, where are you to come from to use up the clay in the years to come, when the banks are worked out? The steam shovel or dredge will then appear on the scene to take out of the river the finest of blue clay.

There is one yard here that uses a railroad of very nearly a mile in length to get its product to the tide water; a dummy engine being the power.

I am able to report a small break in the prices of brick this month, but it is the kind that tends to "break" a manufacturer. Pale has dropped about 50 cents per M; they were low enough before.

My New York advice says the market shows twenty barges and a number of sailing vessels in the market yesterday. Prices about the same for hard; \$4.50 and \$5.25 for Haverstraws; Up Rivers, \$4.25 and \$4.75; Hackensack, \$4.75; Pale, \$2.00, \$1.50 and \$1.25. The last named figure is the amount of freight on them, besides one shilling for selling. Thanksgiving day has just past. I should think that the manufacturers of the Pale that sold for that cost has just cause to be thankful that he has no larger shrinkage, that the commission man was able to sell for the freight.

A. N. OLTIMER.

Philadelphia News.

Editor Clay-Worker:

Brickmaking is almost at a standstill. There are a few yards operating on half time but many are shut down altogether. All are fairly busy, however, but have enough brick left over from the spring and summer run to last them well into winter.

The massive brick and stone bridges over the streets on the lines of the Reading Terminal, are well under way, and no doubt, but what this road will eat up millions of brick before the work is finished.

The Peerless Brick Co., are quite busy. They have the contract for supplying the new Market House at the Reading Depot, 12th and Market Street, with the buff brick, and it is said the number of brick required will be very large.

Henry H. Hartman, a Pottstown brickmaker had invested \$500,000 in that borough a few years ago, and has recently sold the same land for \$7,500, after utilizing the clay thereon for brick-making purposes.

Armstrong & Conkling, manufacturers of architectural terra cotta, with plant on 46th St. and Girard Avenue, are to build a kiln house and drying and moulding rooms. The buildings, three in one, will stand on the north side of Girard Avenue, west of 45th Street, and will measure forty-six feet front by nine-

ty-five feet deep, with brick as the building material.

The Bustleton Brick Co., Ltd., have commenced action against the Crescentville Brick Co., on a contract for brick sold and delivered. The defence claimed that the plaintiffs had not kept their contract and that the Crescentville Co. were entitled to a set off for the loss incurred in consequence. Verdict rendered for plaintiffs.

Dr. Liffman, the most noted chemist in this city, has analyzed the white deposit on bricks, and has found it to be nothing more nor less than Magnesium Sulphate, Epsom Salts. Its presence is thus accounted for: Mortar contains lime and Magnesium, while the air is full of Sulphuric acid, and, which, upon contact with the mortar, metamorphoses it into the sulphates of lime and of magnesium. The brick itself is porous, and after a rain exudes water, and with the water the sulphate of lime, being insoluble, remains behind. The water finally evaporates and thus the magnesium sulphate residue is formed which so mars the beauty of brick buildings. The remedy for this efflorescence is the painting of the brick either with the ordinary article or with paraffine. If householders, instead of muttering customary curses, would mount ladders and carefully scrape off this deposit they would have on hand a constant supply of epsom salts.

A company composed chiefly of well known builders is to be organized in this city for the purpose of manufacturing mortar. A number of Philadelphia capitalists are to back the scheme together the Charles Warner Company, of Wilmington, Del., who have already started a company of this character in that city.

A number of the prominent builders of this city took a trip to Wilmington to inspect the works in operation and expressed themselves highly in favor of the methods used. The idea is a new one and is destined to do away with the mixing of mortar by hand.

Pompeian, or mottled brick, have become very popular, and the Peerless Brick Co. have about as much as they can do in supplying them for some time to come.

Quite a number of our streets, principally in the outside districts, have been paved with West Virginia vitrified brick. Those that have been laid for a period of from two to three years, notably in West Philadelphia, have given very good satisfaction. When properly put down, our contractors say, it makes the best roadbed now in use. It is much better than the asphaltum in that it gives a foothold for the horses, and is easier to remove when the street is to be dug up for the purpose of laying water or gas pipes. For the better class of building a fine grade of the vitrified fire brick is being used for the building of fronts, which give a very handsome appearance to the structure.

Manufacturers of brick machinery, as

a rule, have little to do just now, but the idea prevails generally that the coming year will be an unusually prosperous one. ANON.

Do the Most Successful Brickmakers Use Machines of Large Capacity.

Editor Clay-Worker:

I would like to say a few words in reply to Tim Tinker's letter in the November number of the CLAY-WORKER. By the tone of this epistle he has let his mind run through a Chambers machine, and makes the startling assertion that the most successful brick manufacturers of this country use large capacity machines. In the first place, who is a successful brick manufacturer? Is he one who makes the greatest number of bricks per day, or is it one who has carefully experimented with his clay, learned how to produce the best results and runs his plant in an economical manner? The greatest number of brickmakers in the country are unfortunately so situated that they cannot use a machine of large capacity, even if they could buy one. If a manufacturer makes the best brick from the clay he is working, and keeps his expenses down so there is a good profit for him, he is a successful brickmaker, be his works large or small.

The capacity of a yard is what a manufacturer can make and make the best. Probably Mr. Tim Tinker has seen yards where brick were made by hand successfully. Seems to me I have heard of some such cases. At least the manufacturer saved some money out of the business. In our country if a man makes money out of the business he is engaged in he is looked upon as being successful. What in the world would nine out of ten brickmakers in the United States do with a machine which makes from 50,000 to 60,000 bricks per day? They would lie idle eleven months in the year, and I am dead sure that wouldn't be a howling success. It is probable that if I were in a city where I could use a machine of large capacity, and could find sale for all I could make, I would have one. Then it is more probable that if I had the capital to build such a plant I would buy a farm, and also what few brick I should want to use. The last question Mr. Tinker asks is, "What would you do if you had two machines of small capacity and they should both break down at the same time." That seems to be an idle question. Why, telegraph for repairs immediately, allee samee, you had break in big machine. WHY.

"One-half of the world does not know how the other half lies;" quoth an original thinker in a select company, one evening. "You never lived in our town, out in 'Elinoy,' or you wouldn't talk that way," was the reply of a live 'sucker' who had been victimized by the town gossip.

THE SCIENCE OF ADVERTISING.

The first thing is to have for sale something that somebody needs. The object is to inform him where he can get it; here an important consideration is a paper that he is likely to see. A man having a good work horse for sale would not seek a sporting man's paper, but a paper read by sensible business men; while a sport, having a fancy horse to sell, would steer clear of a paper read by sensible men. It is not always the paper that has the largest circulation that is the best advertising medium. The value of a paper as an advertising medium depends upon the character of the readers much more than upon their number. The *New York Herald* is a better medium for "personals" relating to matrimonial correspondence than the *Tribune*, because the kind that look for such advertisements take the *Herald*, not the *Tribune*. On the other hand, the man who has substantial goods for sale finds ten readers in the *Tribune* to one in the *Herald*, for, if substantial men take the *Herald* because it is newsy, they read only the news, never the columns of trashy advertisements that are found in it. And wise advertisers study these facts and act accordingly; hence all the clamors about "the largest circulation" is usually the vaporings of a fraud with intent to deceive the unsuspecting. Then there must be a fitness between the thing advertised and the readers of the paper. We would hardly insert, if offered, a displayed "ad." of some profound theological book, for, while we expect our readers to be sound in theology, they are not making theological hair-splitting a business. They expect their doctors to study thesapeutics, and they will pay for the application of the knowledge when they call for its use, and the same for the nice points in theology; and we propose to make our advertising space contribute to the purpose of our magazine *how to best work in clay*, while having an eye to the help these advertisements incidentally afford towards lubricating the machinery we use for that purpose. On the other hand we would think the man demented who would take to a theological paper a description of some new invention in brickmaking. For this reason we claim that our advertising columns should attract as much attention and study as any other department of the paper. We would hardly over-estimate the value of our advertisements to our readers if we should say that the chief end of a trade's paper is to give such information.

The science of advertising embraces another thought. It is not enough to get your wares before the people, but you must keep them there. This world is traveling at double-quick, and it does not take long to pass clear out of sight of the man who stands still. If you think that because you have a good thing it will advertise itself after the first dash, you will wake up some day to find yourself and your goods lost sight

of. If you would enjoy the procession you must keep up with it. The tortoise that ran the race with the hare beat the hare to the goal because he kept at it, while the hare, after a few jumps, went to sleep. If your goods are worth introducing to the people they are worth keeping before the people. Take the perseverance and the success of some patent medicines. For twenty years they have kept in the leap of the market by continuous advertising, while others, quite as conspicuous for a time, and quite as good, are forgotten. The old preacher who defined *final perseverance* as always keeping at it, understood himself and his subject.

AN ILLUSTRATED HAND-BOOK.

BRICKMAKERS' MANUAL. T. A. Randall & Co., Publishers, Indianapolis, Ind. Price \$3.00.

From a practical standpoint this is undoubtedly the most valuable work on brickmaking yet published. The authors, R. B. Morrison and J. A. Reep, are not only able writers, but are both successful brickmakers of large experience, and have told in a plain, concise manner what they know about brickmaking, and that is saying a good deal. Every branch of the work is fully explained. From the opening chapter, which is devoted to "Hints on starting a brickyard," through to the closing pages it is brim full of instructive matter. No brickmaker who does not "know it all" should be without it, while the new beginner or student will find it well nigh invaluable. The index is very elaborate and makes it especially valuable as a book of reference. It is handsomely bound in cloth with gilt title, and contains over 200 pages. To those looking for practical information it is worth many times the price.

SOME SPECIMENS OF MECHANICAL ENGRAVING, by Chas. A. Nicoli, is the inscription very tastefully wrought on the title page of a little pamphlet recently received. The "Specimens" are works of art, and speak in no uncertain terms of the engraver's ability. Mr. Nicoli is recognized as a master workman, and a plate bearing his name is sure to be worthy of close inspection.

Many manufacturers are now arranging for various improvements in their works for the coming season. The putting in of new machinery of large capacity will leave them with small machines and appliances that are to all intents and purposes as good as new, which may be easily disposed of by a small "ad." in our "For Sale, Wanted, Etc." column.

"Tommy," said mamma, tearfully, "it gives me as much pain as it does you to punish you."

Tommy (also tearfully). Mebbe it does, but not in the same place.—Ex.

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ADVERTISING RATES furnished upon application.

Correspondence on all subjects of interest to Clay Workers is solicited. Communications from practical men will always be welcome. Address all communications to

T. A. RANDALL & CO.,

81 Massachusetts Ave. Indianapolis.

TAKE YOUR "PARTNER" WITH YOU.

We are so confident that the meeting of the National Brick Manufacturers' Association, at Washington City next month, will be not only the largest, but every way the most enjoyable and therefore the most profitable yet held, that we want to make an additional suggestion. Take your "partner" with you, if you have one, and if you have not, hurry up and get one. No man can run a brick yard at its maximum profit without a "partner," nor any other honest business, for that matter. You need one to council with every day, but especially at those turning points which come occasionally in every man's experience, to say nothing of carrying the business forward during your absence or sickness, without leaving it wholly to a superintendent whose interest in affairs is usually measured by his salary. Now, to be really serviceable, the "partner" should be posted in everything connected with the business, and for this reason you want one who is neither blind nor deaf and dumb, but who can see as well as you can, and, when necessary, can speak readily. At this season of the year you can both be spared from the immediate work of brickmaking. Remember that this convention is your after-harvest vacation. You have been making brick, not only through the hot suns of July and August, but down to the frosts and rains of November. It is now your after-harvest season, and both members of the firm are equally entitled to the rest and re-

laxation of a vacation. Take your "partner" with you to the convention. She has as abundantly earned the fatigues of travel and the discomforts of hotel life as you have, and she will enjoy the beautiful scenery of the mountains and you will enjoy them all the more because she is along. She will be delighted and instructed by the papers and discussions of the meeting and you will be all the more profited because she is there to hear and learn; and if need be, to speak for herself. If you take a stroll through the Capitol, or so far forget yourself as to look down from the gallery upon the pandemonium called "The House," you will enjoy the former and be disgusted with the latter all the more because she is there to see and hear what you never can describe; or, if you take a boat ride to Mt. Vernon, or call in a body upon the President and extort from him one of his inimitable speeches, you will be glad she is along and so will she be. And when you return to take up the thread of business you will both be the better for the experiences of the convention, even counting the slight cost and the fatigues of travel. Take your "partner," if you have one; if you have not, hurry up the half-contemplated preliminaries and get one. There are three weeks yet remaining—time enough, and little enough. We have our opinion of the brickmaker who is trying to get along without a "partner." To say the least of him, he will not get much good out of the convention if he even has "get up" enough to "get there."

A RETROSPECT AND THE OUTLOOK.

We have reason to believe that comparatively few of our readers have occasion to look backwards upon the business of the year just closing with any other than pleasant thoughts, for generally it has been one of prosperity. In so large a constituency as ours it can not be but that there have been cases of personal bereavements and individual losses, but the grand aggregate has been one of prosperity. Laboring men never received larger compensations for their work, and yet a dollar never bought more of the comforts of life than during the year just closing. This has been a fruitful year to the husbandman who has worked with his hands; though, if we are to credit those whose chief work has been with their mouths, times have been hard enough. 1891 has been an exceptionally prosperous year with the rank and file of our patrons, and the

outlook for the coming year is very promising. We need to give no word of encouragement, but rather a word of caution. Do not allow any scheme of speculation to turn you away from the slow but sure rewards of honest brick-making. The shoemaker should stick to his last, and the brickmaker to his clay, but not in it. A happy and prosperous year to all!

THE BEST KIND OF CLAY FOR BRICK

"A young brickmaker" asks us to give some directions by which he may determine what is the best kind of clay for brickmaking. A complete answer would require a volume, and after reading the book our young friend would have to resort to actual experiment with his clay before he could tell its real worth. Clays which look alike do not always work alike, and the cheapest and best test is the working and burning of the clay. No test within the reach of an ordinary brickmaker will do away with the necessity of the test of fire. What is true as to clays for brick is equally true of clays for tile. The proof of the pudding is first in the eating of it, then in the digesting of it. The test of clays is first in the burning, then in their powers of endurance, albeit many a soft and worthless brick is charged up to the clay, when it should be charged to the want of skill in the man who made it.

SIDE ISSUES.

We all know that it is not a good thing to have too many irons in the fire. However, there is no occasion for limiting our researches for the sake of justifying a good old proverb. Let the shoemaker stick to his last, is a very narrow sort of an expression. Shoemakers who have stepped outside of this proposition have frequently done well.

It is a part of the business of this journal, not only to advance the interest of the clayworkers in the lines which they are now following, but to do what may be done to augment the general resources of the fraternity. Along this line we have agitated the success of roofing tiles. We have agitated, with strong prospects of success, the question of glazed brick. - We have done what could be done in our field to help along brick paving. While we do not claim to have any part in the origin of any of these ideas, we hope that we have done something in the direction of a general

enlargement of the field of clayworkers. Roofing tiles are old. We have done our part to resurrect them from history and make them practical in every day work. Historical facts are valueless if they do not help produce something. We care nothing for the history of roofing tiles, or any other clay product, unless it has modern significance and modern value.

In this month's issue of the CLAY-WORKER we have imported a new clay idea, and we hope to have it moulded and burned in a practical form. We refer to the gable finish and gutter moldings, which are illustrated in connection with an article by our foreign correspondent. The idea is a good one. In the first place, it is not an experiment, it has good history back of it. In the second place, it improves the character of all building work. It is a step in the right direction, and as such a step it is one of the things which will move. Good ideas always go forwards, they never step backwards. As an idea which is not experimental, which will contribute to the improvement of building in America, we commend the matter to our readers. The manufacture of this material is not difficult, none of it requires any more skill than the manufacture of pressed brick, and none is beyond the skill of calyworkers of ordinary intelligence. As an enlargement of the field of clayworkers, we hope that it will be taken up at once. The developement of new ideas of this kind reduces competition. It makes the field broader. Not all brickmakers will rush into the manufacture of roofing tiles and glazed brick, but enough of them will do it to make the general field broader and more profitable all around.

NO TIME FOR LEISURE.

The biographer of the late Horace Greely tells a characteristic story of that great man. Some one having business with him, pushed his way to Mr. Greely's desk where he was busy writing. The visitor stood a moment to be recognized, but the editor kept writing away without stopping to speak. Whereupon the visitor said: "When you have leisure, Mr. Greely, I would like to speak with you a moment." Looking up, Mr. Greely said: "I never have any leisure, but I can take all the time that is necessary for any business." The editor was partly right but vastly wrong. No man

has any right to take upon himself such burdens that he can never have moments of leisure—moments of entire *abandon*. This is very different from moments going to waste. Every man should have at hand some employment that can be taken up or laid down at pleasure. As a rule the best employment for these scraps of time which all men have at command and which too many let go to waste, is reading some good paper or book. If those scraps are likely to be at home, and there are no children to amuse or be amused, have a book ready if you can devote only a quarter of an hour to it. If they are likely to occur at some nooning hour or during a shower, have a book and read a page or ten pages. Enforced leisure, in such cases, may be turned to good account. A man in health needs no noon nap, but he does need a noon rest. Make that a profitable hour. In this sense no one has time for leisure.

HO! FOR THE CONVENTION!

It has been suggested that those who are going to the Convention from a distance can secure special car service and other desirable advantages if they will rendezvous at the principal railway centers and make the trip together instead of straggling in, in ones and twos, as is usually done. Such an arrangement will certainly add much to the pleasures of the trip and may also lessen the expense. Those going via Chicago are requested to communicate with D. V. Purington, Chamber of Commerce Bldg., that city, who has charge of that division, and will cheerfully give information relative to time of starting, route, etc. Mr. Anthony Ittner, Mechanic's Exchange, St. Louis, Mo., will head the delegation from that section. At Cincinnati arrangements will be made by W. A. Eudaly and B. W. Blair. Already a large party has been organized to go from Indianapolis and it is proposed to have special vestibuled sleeping cars to run through from there to Washington. All who can go that way are invited to join them. The party will leave Indianapolis Sunday afternoon, January 10th. T. A. Randall will give additional particulars. A much more enjoyable trip will be had by going in a body and it is hoped those living near or beyond the cities named will arrange to join one of these parties. Tickets may be purchased from starting point through over the route selected by the party which dele-

gate wishes to join. The one thing necessary is to write to the gentleman having the matter in charge that you will join the "gang" so that berths may be reserved. Don't put off writing till the last day but take the matter up at once so that you may be informed of the route selected. Remember, too, that all are invited.

MAKE THE MOST OF LIFE

We call him a miser who owns millions yet lives like a beggar. It is not necessary to own millions or even hundreds to be a miser. Many with very small incomes are miserable, because they do not make the most of what they have. Wealth may purchase material comforts, but wealth alone cannot produce the most enjoyable essentials to happiness. The little waif who, on cuddling down for the night on the cellar door, said to her mother by her side, that she felt sorry for poor people who had not a cellar door to sleep on, was making the most of life. He who sees nothing but the dark side is never happy. Be happy yourself and make your home happy by the reflection of your own happiness, and you will be making the most of life. Then go out to say a kind word or do a kind deed to some fellow mortal and thus make the most of life. He was a philosopher who, on being asked if he enjoyed good health, answered, "Yes, when I have it." He was making the most of life. Some people never enjoy anything. They are misers. Make the most of life.

GOING IN A BODY

At a meeting of the Western Pennsylvania Brick exchange, Pittsburgh, Pa., the following prices for the next season were decided on: All hard common brick, \$8 per thousand; soft or salmon, \$7.50; paving, \$10; common front, \$12; select stock \$15; pressed stretchers \$18; these prices are an increase over the present year, made necessary by the advance in natural gas fuel at the kilns from the original price of 80 cents to \$1.75 per thousand brick. The new prices will take effect on January 6, 1892. E. C. McGraw was elected delegate to the National Brick Manufacturers' Convention, which meets in Washington D. C., in January. A number of the members of the exchange will be in attendance there and they have decided to charter a special car for their use.

BRICKYARD SKETCHES.

THE CONVENTION CITY.

AMONG the many notable things to be seen in and about Washington, few, if any, will be viewed with more interest and reverence by brickmakers than an ancient brick machine to be seen at the yard of A. Richards & Co., located in the southeastern part of the city—South Capitol and O Streets. The machine was built by an inventor named Sawyer way back in the thirties. In appearance it somewhat resembles a stamping machine. It is a two-sided affair, having three molds or dies on each side into which the clay is fed, after being

carefully pulverized, and pressed into proper form and density. Each plunger works separately, and with suitable clay a good brick is produced. Mr. Alfred Richards, who still has active supervision over the works, purchased the machine second-hand in 1844 and began the business of brickmaking a short distance from where the present plant is located, running several hand gangs and this Sawyer machine. For the first time in all these years the machine has stood idle this season, the clay they are now using not being suited to it. We doubt if this record can be equaled anywhere, and think the machine ought to find a place in the National Museum. The attention of Machine Manufacturers, Tim Tinker, et al., is called to this old relic. They can use it to "Point a moral and adorn a tale." It shows what a machine will do, IF properly oiled and cared for. Just think, fifty years of actual service and no repair bills. Mr. Richards says the machine seldom, if ever, broke down or got out of repair. Shades of Departed Saints and Dollars, think of it! Messrs. Richards are now making 40,000 brick a day on a Gram machine, which seems to be a general favorite with Washingtonians. Their clay bank is almost exhausted and next season's supply will, probably, have to be carted from a distance. The last season's supply has come largely from adjoining property, where streets were being cut through and graded. It is passed through a dry pan of primitive design, though still very efficient, easily pulverizing clay for 40,000 brick in 8 hours, and then carried up in cup eleva-

tor to machine. From machine the brick are dropped on a belt that carries them to off-bearers, who pile them five high on iron cars. They are then run into furnace heated tunnels one hundred feet in length, which dries them in 24 hours. They are burned in common up-draft kilns with permanent walls, set 42 to 45 high, with coal which costs \$3.25 a ton. They watersmoke five days and finish in two, making seven days all told. They, also, make by hand, running twelve gangs that make 2,333 a day each. Also, make a limited number of press brick, which are repressed by hand in the usual manner and burned in the center of the kilns with the common brick. A portion of the hand-made brick are molded quite a distance from the dryers and kilns, to which they are taken on barrows. The haul is so long that the men have a half way station or resting place, where they stop to take breath. We kodaked a couple of them in the act, as is shown in the accompanying sketch.

The yards of John Webster, J. E. Herrell & Co., Martin Bros., Jas. H. Richards, E. M. Grinder and Ford Bros. are all located in this immediate locality, but

works, which are located on the Penn. Railroad some four miles from the city, where there is quite a brick settlement, a half dozen, or more, yards, large and small, being within a stone's throw, almost. The Hydraulic Company's plant was erected late in 1889 and they began making brick in February, 1890. This is one of the many offsprings of the St. Louis Hydraulic Press Brick Co., and, like all of their undertakings has proven very successful.

Everything about the plant is substantial and orderly in appearance, evidencing careful management and good business-like methods. They have in all 50 acres of good clay land which insures them ample material for many years. Their attention is given to fine front and ornamental brick, almost exclusively. The clay is plowed, or, more properly, harrowed to a depth of two inches. This work is very severe on horses, so that they have called steam to their aid and use a traction engine for motive power. After the clay has dried sufficiently, it is "gathered" and stored under large sheds where it is left to "cure" for several months—the longer the better. When needed, it is hauled by



THE HALF-WAY STATION.

lack of time prevented our visiting them. Mr. John Miller is going to establish another plant here in the spring, the clay to be brought down the river in barges, which, he thinks, will be more economical than to make the brick at the clay bank and ship them.

THE WASHINGTON HYDRAULIC PRESS
BRICK CO.

In company with Mr. Henry Wells, General Manager of the above named company, we recently visited their

horse-power in dump cars to pulverizer, which reduces it to a powder, almost, and it is then elevated and passed down through sieves, which remove all lumps and pebbles, into machine. They have two hydraulic presses—one ten and one five-mold. The latter is used mostly for the finer grades of ornamental brick. From the machine the brick go directly to kiln. They have eight of the Graves patent up and down-draft kilns, holding 130,000 each. The brick are dried and

watersmoked by the heat from cooling kilns, which is conducted from one kiln to another by a system of pipes running over the kilns, the current or draft being controlled by exhaust fans, operated by steam power. They, also, have five ordinary down-draft kilns of 300,000 capa-

been produced in this country. Though it is a comparatively new feature with them, they seem to have thoroughly mastered the art of enameling and glazing and now offer the building craft decorative material that cannot be surpassed either for interior or exterior or-

their "ads." on pages 500 and 501. The Somerset Pottery is one of the oldest clayworking establishments in New England, having been first established in 1820.

The present Company has enlarged the works and are doing an extensive business. They make vitrified paving brick, fire-proof building blocks, fire brick, enameled brick, cupola, furnace and stove linings and pottery, using the Johnson machinery and kilns, with which they are well pleased. The clay is shipped from New Jersey in boats to their own wharf. Rather a long haul 'twould seem for a plant, making 35 million brick a year. Our next stop was at the beautiful city of

NEW HAVEN, CONN.

We did not have time to visit any of the brickyards, but we met several of the Bricks, and they are all No. 1 Hard. Not a Salmon among the lot. Cheery Capt. Crafts, full of years and sunshine, genial Frank Stiles and that prince of good fellows Charlie Merwin made our visit so pleasant that it seemed a hardship to say good-bye,

They and their wives and neighbor brickmakers will be at the Convention in Washington. They look upon the yearly meeting of the N. B. M. A. as their annual holiday.

AT WILMINGTON, DEL.

We stopped off between trains and was met at the station by great-hearted "Jim" Beggs who treated us to a very pleasant drive about that thrifty city. We also visited his brick yards—he has two—but only took a casual glance about. At one yard they make by hand while at the other they make 25,000 a day on a Penfield soft clay machine and 40,000 on a Chambers. The latter is the second machine made by the Chambers Bros. Co., and has been in use on Mr. Beggs'

yard for twelve years and is good for as many more, he thinks.

They have a Sharer tunnel dryer, which does good service, and burn in common up-draft kilns. Mr. Beggs makes a specialty of fine molded and ornamental brick which are made by



THE LAST OF A CLAY BANK.

city each, in which they burn their common brick. They use coal and burn in about ten days, half that time being required to watersmoke. An addition to their stock sheds has recently been completed, making that structure 400 feet in length and 64 wide. A double track runs through it and cars may thus be quickly loaded from any of the various piles of fronts and ornaments, which are carefully sorted to almost any desired shade of color.

Their product goes to the Southern States mostly, though they have a large local business.

AT BOSTON, MASS.

From Washington we journeyed as far East as the Hub, where we found the Builders' Exchange occupying their new home, which is simply elegant. The incomparable William Sayward, whose work as Secretary of the National Association of Builders has made him famous throughout the land, showed us over the building, which is a model of convenience and should be patterned after by kindred fraternities throughout the land. From cellar to roof everything known to modern building is provided for the comfort of the members. No expense has been spared and the result is a splendid monument to the master mind that conceived it and the master workmen who have executed the work. On the first floor Messrs. Fiske & Coleman, manufacturers of fire brick, have fitted up a cozy office, and show a line of enameled brick and terra cotta that surpasses anything that has ever

namentation. Mr. Fiske will be at the coming annual Convention of the N. B. M. A. and exhibit some specimens that will be a revelation to very many of the craft.

A few miles from Boston on the Old Colony Railroad in the little hamlet of Somerset, the adopted home of our English cousin, Mr. Johnson, the noted



A CLAY GATHERER.

inventor of brickmaking machinery and kilns, which are now being offered to American craftsmen through the Somerset & Johnsonburg Mfg. Co., who are sole agents and owners in the U. S. A. and Canada of the Johnson patents, as our readers may see by referring to

hand and repressed and burned in the center of the kilns with the common brick. The front brick are very fine and are handled with much care. They are carefully packed in straw and are delivered to buildings in two-wheeled carts holding 700, the bed or box of which is detachable.

Mr. Beggs has had a large experience in making front brick and is recognized as an authority on the subject.

SOME SAY

There are many new "ads." in this issue, and several from firms new to our readers. The demand for space has compelled us to again enlarge the CLAY-WORKER, and yet some say we carry "dead ads." What some say though is not always authentic. Some say things that are not true.

A MALICIOUS CORRESPONDENT.

The Animus of the Sheet Called "The Brickmaker" Again Exposed.

The following lines appeared in The Brickmaker, of November 15, page 15:

"Our correspondent informs us that the Colorado Fire Clay Manufacturing Co., Pueblo, Colo., D. W. Collins, president; J. R. Farris, secretary, who lately tried on their yard a United States Pressed Brick Machine, have thrown it out and have ordered one of the renowned four-mold Boyd machines in its place. This company has an elegant clay and favorable location for the demand of their class of goods."

We do not wish to enter into any criticism as to the irresponsibility of that paper and its so-called editor, as we believe that the correspondent who wrote the above is a member of the firm of Chrisholm, Boyd & White, who use the noble, so-called, editor of the sheet as their mouth-piece.

The following letter will clear up the cloud and expose the falsehoods that some stoop to for their own miserable gain.

THE UNITED STATES BRICK PRESS CO.

December 12, '91. Chicago, Ill.

(Copy.)

D. W. COLLINS, J. R. FARRIS, H. H. COVERT,
President. Vice-Pres. & Treas. Secretary.
COLORADO FIRE CLAY MANUFACTURING CO.,
Office Farris Hotel.

PUEBLO, COLO., December 9, 1861.

U. S. Brick Press Co., Chicago, Ill.

Oswald Kutsche, Prop.: The four-mold machine purchased by us from your company is running in our yards, having already made over five hundred thousand brick. Said machine is giving us satisfaction, and we cheerfully recommend this machine to any one who may contemplate the purchase of a first-class dry-press machine. The increasing demand for our material will necessitate the purchase of one of your two-mold machines in the near future. Respectfully,

(Signed)

COLORADO FIRE CLAY MANUFACTURING CO.,
By D. W. Collins, Pres.

TRADE LITERATURE.

We are indebted to Jonathan Creager's Sons, of Cincinnati, Ohio, for a copy of their new catalogue of clayworking machinery. Typographically, it is a beauty, and there are several novel features that will make it valuable to those contemplating the erection of new plants or re-arranging old ones. It is a large and expensive book, but we presume it is for free circulation and that any of our readers may secure a copy by writing them mentioning the CLAY-WORKER.

J. W. Penfield & Son, Willoughby, O., have favored us with a copy of their new catalogue of stock brick machinery, a handsome little book of 50 pages, which they will mail to anyone applying for it. They also say they will gladly send free to any of our readers a copy of their valuable book on Brick Pavements.

The McLagon Foundry Co., New Haven, Conn., are now sending out a new catalogue of their brick machinery which contains much that is of interest to brickmakers in addition to the usual illustrations and descriptions of their appliances. Send for a copy.

THE ILLINOIS CONVENTION

The Illinois Brick and Tile Association will meet at Springfield, Ill., Tuesday and Wednesday, January 19 and 20, 1892, in the Senate Chamber of the Capitol Building.

PROGRAMME.

TUESDAY, JANUARY 19, 10:00 A. M.

Call to order.

Making up of roll of membership.

Reports of members.

Adjournment.

AFTERNOON SESSION, 1:30 P. M.

Annual address by President B. F. Tenney,

Bement, Ill.

Practical Tile Making.

M. E. Donohue, Ivesdale, Ill.

"Hollow Brick and Their Uses."

General Discussion.

"Shale and Its Uses."

Joseph Stafford, Springfield, Ill.

Discussion.

Adjournment.

WEDNESDAY, 9:30 A. M.

"Mismanagement of Yards."

Wm. Stare, Mendota, Ill.

Discussion.

"Manufacture of Brick and Tile."

C. C. Jenkins, Tolono, Ill.

Discussion.

"Burning Paving Brick."

H. Dawson, Sr., Springfield, Ill.

Discussion.

Treasurer's Report.

Bills Against the Association.

Election of Officers.

Adjournment.

WEDNESDAY, 1:30 P. M.

"Crude Oil as Fuel."

N. W. Reid, Jacksonville, Ill.

Discussion.

"Burning by Slack Coal."

General Discussion.

"The Tile Palace"—A Poem,

By D. O. Loy, Monticello, Ill.

Adjournment.

The St. Nicholas Hotel has been secured as headquarters for the members attending the convention.

G. C. STOLL, Secy.,
Lexington, Ill.

B. F. TENNEY, Pres.,
Bement, Ill.

EDITORIAL NOTES and CLIPPINGS.

A large brick plant is to be started at Connersville, Ind.

Jas. Ford, of Dover Point, N. H., will start a brickyard in the spring.

A large brick factory is to be built at Oneonta, N. Y., in the spring.

Thos. J. Timmons, Goodwin, Tenn., will purchase brick machinery.

T. M. Walker is going to start a paving brick plant at Des Moines, Ia.

Willis, Tex., wants a brickyard. There is plenty of good clay there, 'tis said.

There was a \$5,000 blaze at McCoy's brick works near Augusta, Ga., the 8th.

Stark & Huss, is the name of a new firm that will make brick at New Riegel, Ohio.

B. F. Walton's brick works at Trenton, N. J., were burned the 5th inst. Loss \$4,500.

A. Reeser, Washington, La., will build brick and tile works at Franklin, St. Mary's Parish.

J. H. Allen, Black River Falls, Wis., wants to purchase machine for pulverizing plaster.

R. H. Lacey, 23 S Howard St., Baltimore, Md., will probably erect a large press brick plant in Va.

G. Gray Mumma, 300 N. 13th St., Philadelphia, Pa., contemplates starting a brick plant near that city.

The White Castle Lumber & Shingle Co., White Castle, La., contemplate starting brick works there.

The Austin (Minn.) Brick Co., will rebuild their plant, which was burned recently, on an enlarged scale.

Pockard & O'Connor's brick plant, near Cleveland, O., was burned the 9th. Loss \$9,000. Insurance \$4,200.

W. V. Parmley, Albion, Erie Co., Pa., wants illustrated catalogues and price lists of brickmaking machinery.

J. A. Beem and A. J. Sheppard, of Zanesville, O., and others, will establish a large brick plant at Roseville, O.

Those wanting situations or experienced help should keep an eye on our "Wanted, For Sale, Etc." columns.

The Vulcan Clay Co., Wellsville, O., want to purchase a soft clay brick machine with daily capacity of 25,000.

Paul W Krause, 625 Washburne Ave. Chicago, Ill., desires information relative to the erection and operation of muffle kilns.

A. H. Hews & Co.'s pottery works, in North Cambridge, Mass., were burned recently. Loss \$40,000; insurance, \$25,000.

The Oakland Brick Co., of Pittsburg, Pa., has been incorporated by G. W. Schmidt, J. J. Hawley and others. Capital, \$33,000.

R. Truswell & Co., Marquette, Mich. are thinking of enlarging their plant and will be glad to receive catalogues of machinery, etc.

The Oskaloosa (Ia.) Paving Brick Co., contemplate changing from coal to oil and desire information relative to burners, pipes, etc.

A terrific wind storm recently passed over Muskegon, Mich. Kelly Bros.' large brick factory in the suburbs was blown down. Loss, \$10,000.

The Garrison Vitrified Brick Co., of Huston, Texas, has been incorporated by G. F. Arnold, W. M. Mitchell and others. Capital, \$100,000.

Sharpsburg, Pa., is to have a new industry—the Sharpsburg Brick & Stone Co. A fine, large factory will be erected. C. H. Warner and others are interested.

The McLagon Foundry Co., of New Haven, Conn., report a very satisfactory business for the past season and a most promising outlook for the coming one.

A great deal of paper and some lead-pencil and some wind are being consumed in Mendota, Ill., in figuring and arguing about a Paving Brick Plant.

Mr. J. H. Taylor, Peidmount Mo., will put in a new brick plant this spring; having purchased an outfit from G. C. Stoll, Agent, the Adrian Machine Co.

G. I. Neptune, and others, Vincennes, Ind., contemplates the establishment of brick works in that vicinity. They will utilize the clay and shale found in the coal mines.

The Tile and Brick Plant of L. F. Straight, El Paso, Ill., was burned to the ground on the night of Nov. 18th. The factory was well equipped and doing a fine business.

The Tile Works of Lynch & McMichael, Ransom, Ill., were burned recently. Loss \$8,000. No insurance. The fire was of incendiary origin. They will rebuild in the spring.

E. L. Cook, formerly with C. P. Merwin, of Berlin, Conn., is going to establish a soft clay brick plant near Titicut Station, Plymouth Co., Mass., with daily capacity of 40,000.

Chas. Secker, Baraboo, Wis., intends putting in new machinery in the spring. His clay is "fat" and very plastic. He will probably put in stiff clay machinery so as to make both brick and tile.

Messrs. Thiede & Heilman, prominent and successful brickmakers of Ft. Dodge, Ia., have just placed their order for a 3-Mold Boyd Brick Press, and propose making brick by the dry process for that market.

Good, practical, reliable workmen are always in demand. Those competent to superintend and manage brick works can readily obtain desirable situations by making proper announcement in our "Wanted" column.

The Brunswick Brick & Tile Co., of Brunswick, Mo., are erecting a new dry press brick plant. They start up active operations with a 4-Mold Boyd Brick Press soon after the beginning of the new year. Their capacity will be 20,000 to 25,000 brick per day.

The Salamander Brick & Tile Co., of Chelsea, Mass., has just voted to increase its capital stock from \$30,000 to \$50,000. The company has been so successful in its making of fire brick and tiles that it proposes to enter the field permanently in the manufacture of buff building brick.

The Radford Brick Co., of Radford, Va., who a short time since put in a 4-Mold Boyd Brick Press and outfit for the manufacture of dry pressed brick, have just completed the burning of their third kiln. Mr. Western, the Superintendent, writes that the brick are first-class in every respect, color, finish and hardness.

Fletcher & Thomas, Indianapolis Ind., exhibited at the late Indiana State Fair, in full operation, one of their latest improved Complete Brickmaking Outfits, showing their new manner gearing, which does away with all extra line shafting, belting, etc., and the whole is run with several horse-power less. On another page they show a new cut representing this outfit in a most perfect manner.

The Bonnot Co., is the name of a new clay machinery manufacturing firm, now building a plant at Canton, O. The company has been incorporated with \$100,000 capital, and propose to put upon the market a full line of brick, tile and pottery machinery. The following officers have been elected: President, M. D. Harter; Vice Pres., H. W. Harter; Secy. and Treas., H. W. Whiting; Superintendent, A. Bonnot.

On page 528 our readers will find the "ad." of J. R. Armstrong & Co., who manufacture an improved oil burner, which is said to be especially adapted to brick burning. Messrs. Armstrong & Co., have equipped some of the largest brick plants now using oil as a fuel, and thoroughly understand that feature of the business. They invite correspondence from all who want information on the subject of burning with oil.

The Queen & Crescent Route will sell Holiday Excursion Tickets to all points on their line, also to points on connecting lines in territory east of the Mississippi River and south of the Ohio and Potomac Rivers. Tickets will be on sale December 20th., to 25th inclusive, and December 29th to Jan'y. 1st, 1892, inclusive. Good for return until Jan'y. 5th 1892. For further information write to D. G. Edwards, G. P. A., Cincinnati, O.

P. B. Haven, the senior member of the firm of P. B. Haven & Son of Sangerfield, N. Y., died at his home on Nov. 9, 1891. Mr. Haven was one of the pioneers in the clay industry in Central

New York. This family have been engaged in the manufacture of brick and drain tile for three generations, the business having descended from father to son, leaving one son, A. G. Haven, as the present successor.

The National Association of Fire Brick Manufacturers held their second annual meeting in New York Jan'y. 2nd and 3d. The attendance was large and the discussions instructive and pleasant. We give on another page an interesting paper by O. O. Bowman, of Trenton, N. J., for copy of which we are indebted to Secretary Gleason. Other papers will be given subsequently. The following officers were elected for the ensuing year: H. B. Newton President; John Sheridan 1st Vice Pres.; M. D. Valentine 2nd Vice Pres.; H. A. Maum Treas.; Henry Gleason Sec'y.

The Cherokee (Iowa) Brick Works were almost totally destroyed by fire November 19. Loss \$28,000. Insurance \$9,000. This plant was one of the largest in the state, with a daily output of 60,000 brick. A series of calamities have followed Mr. Starbuck, the proprietor, during the last seven years. His buildings have been blown away twice, the flood of last June damaged him to the amount of over \$10,000, and the recent fire has made his losses from the elements during these seven years foot up to the large sum of \$38,000. But even this last calamity has not crushed him, and he has already declared his intention of building again.

Splendid equipment. On November 20, The Baltimore & Ohio, R. R., placed in service its southwestern Limited Express train running from Baltimore and Washington to Cincinnati and St. Louis an entirely new equipment, built expressly for this train by the famous Pullman company. The new cars embrace all the features that have rendered the Royal Blue Line trains so universally popular, and include the safety vestibule, steam heat, Pintsch gas light, the anti-telescoping device and convenient toilet accessories for men and women. The entire train runs through from Washington to Cincinnati, and the sleeping cars run through to St. Louis and return. Delegates to the coming annual Convention of the N. B. M. A. will find this the most comfortable and elegant train service to Washington. For time table address C. O. Scull, G. P. A., B. & O., Baltimore, Md.

A SMALL MATTER.

'Tis said a woman's letter is never complete without a poscript. However that may be, we know that many of our readers could make their letters to our advertisers much more satisfactory by adding this short postscript—The CLAY-WORKER. No explanation will be necessary. Just say: "P. S.—The CLAY-WORKER," and they will understand and thank you for the information, as they like to know the source of inquiries.

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THE

J. R. ARMSTRONG SYSTEM

— OF —

BURNING CRUDE PETROLEUM.

The secret of burning oil successfully, lies in atomizing it and furnishing sufficient pure hot air at the right point, to consume all the gases generated. Oil cannot be burned economically by admitting cold air to the burner or the flame.

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THE CLAYWORKER.

VOL. XVII.

INDIANAPOLIS, IND., JANUARY, 1892.

No. 1

Written for the Clay-Worker.

THE CONVENTION CITY.

The National Capital, where the Sixth Annual Meeting of the N. B. M. A. is to be held Jan'y 12 to 16, '92.

BEAUTIFUL and attractive as the city of Washington is its scenic wealth

is not bounded by the old corporation limits. The suburbs are rich in all that go to make the suburbs the Mecca of those who are tired of great buildings and paved streets. Volumes might be written of the rural districts which surround the National Capital but for such a literary effort there is no present need; a few words must suffice. There are five hundred acres of park within the limits of the Soldiers' Home property. More than seven miles of broad, hard, well-kept driveways are open to the public—roads that lead past lakes, statuary, arbors and buildings; the latter in harmony with nature's magnificence. In these grounds is the cottage used as a summer residence by several presidents. Arlington, Fort Myer and the range of hills in the vicinity of these

notable points of interest, are worth a visit. At Arlington is the National Cemetery in which lie the remains of more than fifteen thousand soldiers of the Union Army. Sheridan, Crook, Paul and Hazen are among the more promi-

nent of those who await the grand reveille. Arlington was once owned by Martha Washington. From her grandson, George Washington Parke Curtis, the property descended to Curtis' daughter, the wife of Robert E. Lee. The United States now owns the entire

Cavalry are located there now. The veteran warrior, Col. Guy V. Henry, commands the garrison. Up the Potomac are the Great and Little Falls, while down the stream are Alexandria and Mount Vernon. A great many people go to Alexandria to visit Christ Church,

which was General Washington's principal place of worship, while every patriotic visitor makes the pilgrimage to Mt. Vernon.

If anybody wants to know the National Capital as it really deserves to be known, he or she will need to stay here more than three or four days. There are thousands of interesting things to be seen in hundreds of remarkable or historical places. The city is large and its growth is continuous; therefore the average visitor must needs plan his his jaunts so as to see "the mostest things in the leastest time." An old resident of Washington—one who knows all about the city and who has had extended experience in making visitors comfortable—says that a good way to begin sight-seeing is to take a carriage with an intelligent

driver, or one of the many hansom cabs, and ride leisurely through the center of the city—the northwest quarter. A ride like this will enable a stranger to obtain a general view of the prominent localities in a short time, and serve to fix



THE BUILDERS' EXCHANGE, WASHINGTON, D. C.

property. Upon it has been established a cavalry post—Fort Myer—where troops that have rendered distinguished service are quartered. K Troop of the Ninth Cavalry (colored), Troop A of the First Cavalry and Troop H of the Eighth

them in the memory. The route should be taken through the central portions of Pennsylvania avenue, and Seventh, Ninth and F streets, afterwards through the fashionable West End. By riding the entire length of Connecticut avenue from Lafayette Park to Dupont Circle, and then returning through Massachusetts avenue, much of the "palatial section" will be traversed. Then, by extending the ride on Seventh street, below Pennsylvania avenue, the grounds of the Mall can be inspected, with the Smithsonian Institution, the National Museum, the Department of Agriculture, the Bureau of Engraving and Printing, and the Washington Monument. In fact, a ride over such a route will enable one to see in rapid succession, the White House, the Treasury Building, all the department buildings, and many of the finest churches, mansions, parks, squares and circles, and business structures. Afterward the ride might be continued to the Capitol and through the grounds, and then down East Capitol street as far as the Statue of Emancipation, returning by way of North Carolina and Pennsylvania avenues. If, after enjoying a ride over the foregoing route, the visitor should at once leave the city, it would be with a more thorough understanding of its beauty and utility than is possessed by many an old-time resident.

But few people would, however, be satisfied with any such cursory inspection of the center of government. The Capitol, the White House and the National Museum demand especial visits and repay richly any outlay, either physical or financial.

As Congress will be in session while the convention alternates business and pleasure, the Capitol will probably be the focal point for sightseers. Here, for four or five days in each week, the national mainspring will be visible, and any curious individual who will watch matters closely may see the wheels go round. No matter what part of the country attendants upon the convention may come from, they will find their representative here; perhaps he will be attending to business and perhaps he will not. Inhabitants of the District of Columbia will be the only ones who will fail to find legal representatives in the House of Congress. Every Washingtonian is disfranchised by legal enactment.

One of the things to be remembered is the fact that none of those who will come here to the meeting of the Asso-

ciation will be allowed to wander around the city in search of guides. The local committees will attend to everybody's comfort; that is one of the things a Washington committee knows how to do to perfection. Up to this time I have said nothing of the place at which the Association will have its headquarters—the Builders' Exchange. This is a fine modern building situated right in the heart of the busiest part of the city. Those who ought to know say that the Exchange structure is, if not the largest, one of the largest in the country the property of an organization of this character. The Exchange has only been in existence about two years and a half, but its record for progressiveness is solidly founded, and in every way it is a credit to the men who compose the membership. I have already stated, and so have a great many other people, that Washington is not a business city—has no great manufacturing interests—but there is enough doing in the building trades to justify an Exchange building which cost about \$150,000. There are about 250 men who are actively interested in the welfare of the organization—members who give their money and their presence to the institution they have founded and made prosperous. The building has an imposing appearance. It is six stories high and the front is an effective combination of brick and stone. A wide entrance hall leads to the elevator and main stairway. The Exchange rooms occupy the front of the second floor and, separated from these apartments by a large hallway, is the spacious hall in which the sessions of the Association are to be held. Large windows admit all the light anybody needs, while a lofty ceiling makes an unhealthily-heated atmosphere highly improbable. Immediately below the hall, and its equal in point of dimensions, is the room in which inventors, manufacturers, and dealers propose to exhibit such mechanisms and products as may be regarded as most interesting or profitable.

Among the many exhibits which will be made is one which will be priceless. It is a sample of Washington hospitality. The programme is still incomplete as to details but enough of it has been definitely decided upon to promise all visitors a pleasant time. On the evening of the first day of the meeting—January 12—there will be a reception in the big hall. The committee calls it a "powwow" but even that North-American-Indian

designation fails to upset the general conviction that the affair will really be a reception. On this occasion every opportunity will be utilized to further all friendly relations and to bring about new friendships. Investments used in this good work will be such solids and liquids as are usually put in circulation on such occasions. Friday afternoon has been set apart as sacred to an excursion to Mount Vernon. A fine steamboat, capacious enough to accommodate all the delegates—to say nothing of their wives and mothers, likewise their sisters and their cousins and their aunts—has been chartered and will be run to suit the convenience of the committee and its guests. The visitors will own the boat and all that in it is, including that subdivision which is adorned with many shaped and multi-hued bottles, lemons, mint, cloves, coffee and wintergreen. The polite and white-jacketed compounders of beverages will, for that occasion anyhow, be utterly oblivious to the ring of coin on the marble-topped counter. If anyone who attends the meeting of the Association fails to enjoy himself or herself the reason for that failure is not now apparent; the plans (some of which cannot yet be made public) seem to be just about perfect.

GEO. H. HARRIES.

Washington, D. C., Dec. 16, 1891.

Written for the Clay-Worker.

DRYING BRICKS.

No. 2.

BY S. GREEN.

SOMETHING ABOUT THE USE OF HEAT AND RADIATION.

HAVING considered a simple means for putting the air in motion for drying purposes, at but slight cost in power, the question of handling the currents to secure uniform and proper effects naturally presents itself in the broad field so opened, it appears. But let me now call your attention to the accompanying radiating advantages derived from the increased supply of air.

Should we consider the use of air current—say that in the excess of draft created by the use of chimneys—even no more important than heat, as a factor in drying, and thus conclude that the capacity may therefore be doubled; we still come short of the correct estimate in results; as the additional current supposed to accelerate the drying in half of the time of that required when depending chiefly on heat or

high temperature to create the current up the chimney, would employ and move so much more, in volume, to be heated by the limited means before required, the temperature must necessarily be lowered, and moving more rapidly over the pipes, or other surface to impart heat, greater radiation and more heat is thus brought into use, and instead of doubling, the result may be easily four times as much without danger from either increase of temperature, or undue concentration of current; as the use of more volume, or fan wheels, tends, when fairly placed, to distribute the drying or fanning influence, and advantageously multiply the capacity in their liberal employment.

I am well aware that much intelligent attention has been devoted by practical as well as theoretical brickmakers in view of the greatly increased capacity of air to carry moisture, because of greater temperature. But is it not just possible that that field has therefore been pretty well exhausted, and really better opportunity be presented in the use of more air at lower temperature to replace with dryer air and in expelling at low degree of heat, the air so fairly charged with moisture? May we not feel that we can better afford to part with it?

As the moist, cool air may be really of no further use for drying; expelling it from the building must positively make room for and draw in other, and probably dryer and better air to replace it, and also insures better atmosphere and more uniform temperature for the welfare and comfort of those employed within the building.

In works prepared to operate during cold weather, some parts are excessively warm and other portions naturally too cool, as brick works are constructed.

Gentler circulation tends to relieve the excessive heat at the kilns and contribute uniformity in connection with a purer supply of air, and welfare of the workmen, liability to exposure and better condition for the performance of their duties, seem to be worthy of consideration in this connection.

Less outside radiation and loss of heat occurs when the air within is more

evenly heated, and making the drying space more available, increasing the facilities for caring for the product, enables either greater output from the same enclosure, or less building, and consequently not so much radiation or loss of heat for the same production.

The foregoing relates, though rather indirectly it may be, to heating in an economical manner. Let us advance one step further toward the means for heating.

Steam pipes appear to be admirable for not only conveying heat in the character of steam, but for presenting ample surface, especially in the small



HENRY GLEASON, SEC'Y NAT'L FIRE BRICK MFRS. ASS'N, NEW YORK CITY.

one-inch pipe usually used for radiators, the large pipe being preferable for carrying the heat to the radiators, as they do not present in their increased diameter as great a proportion of radiating surface. As the air is made to pass more rapidly over the surface of these steam pipes, and especially in the use of more fresh air at lower temperature—the heat is carried off more rapidly than ordinarily, the steam is more rapidly condensed within, and the greater accumulation of condensed water, necessitates especially steep drainage to be provided to carry it off.

Indirectly this is a means of securing,

through this surface condensation, a very full supply of water for use in the boiler at high temperature, for safe return, and not so much loss of heat; and enabling about all the heat issuing from the engine in its exhaust steam, to be utilized for heating purposes, instead of costing about one-third of its heat for heating the well or cold water for the boiler supply.

That "economy is wealth" we recognize in many ways. In manufacture of brick—providing an economical and effective artificial means for drying, we must fairly regard it in use of exhaust steam—when it is claimed that the steam parts with only about five per cent. of its heat passing through the engine, and if that ordinarily used to heat the feed water may be saved in connection with increased radiation; the exhaust steam with sufficient force left to carry it to the radiators through large pipes for easy approach, and supplied regularly as the work progresses is nearly as valuable for heating as the live steam, and its heat obtained at but trivial cost. As steam pipes are commonly applied with no greater current passing over their surfaces than that created by their own heat forcing its heat and some moisture up a chimney, the greater draft being at the chimney exit, and rather distant from the pipes, and the radiation is thus lessened; much pipe is required; it is necessary for the steam to travel through many more feet of pipe, and soon the pressure of live steam is overcome by friction and undue

accumulation of the water of condensation from it rather than radiation, it may be, the placing of merely quantities of steam pipes does not seem to insure quick drying; their use appears to be limited, and that of slower drying than from the furnace heat.

It is not my desire to complain of these methods, though brickmakers do not generally regard the artificial means for drying as satisfactory, and most of the bricks seem yet to be made and cared for—dried by—the use of plenty of air in motion at low temperature, but outside and limited to favorable seasons for drying out of doors. Certainly I

should not find fault without being able to suggest some better means, and thus avoid the destructive course of pulling down that which may be used, without supplying something in its stead, for I am well satisfied, from the results that have come under my observations, that much better means can be provided.

So well do I feel prepared to defend this proposition, from actual knowledge, devoting not a little consideration and practical test to the subject, and seeking reasons to prove the good results, which seem tenable; whether my reasons are right or not, the working results surely are—so that I cheerfully invite discussion on this subject through the columns of the *CLAY-WORKER*, and close this second series on "Brick Drying" with this on the general introduction to the subject of Radiations, reserving details in construction, it may be, for further communication.

Written for the *Clay-Worker*.

CHIMNEYS AND DRAFTS.

D. W. STOOKEY.

THE question of chimneys and drafts is one that is not generally well understood and yet it is one of great importance to the manufacturer of the coarser grades of clay goods, in which the cost of fuel is one of the principal items of expense. The various styles of down draft kilns all depend upon the chimney for their draft. It is usually understood that the down draft, or downward passage of the gaseous products of combustion, through the wares in the kiln must be produced or forced by the chimney. Since this downward movement is unnatural or at first thought appears to be, so the inference is that a high chimney would be required to produce the desired draft. In actual use we find some down draft kilns connected with tall stately chimneys, while others are only provided with insignificant looking little flues that seem no larger than those used with an ordinary cook stove.

These small exits for the gases from the fires are perched around the edges of the kilns and only extend a few feet above the skew back or base of the crown, and have their tops but little higher than the highest point of the crown. Yet the kilns are doing excellent service, and if advertisements and testimonials may be credited, are giving good satisfaction.

Several scientific principles are involved in the matter of draft of chim-

neys, and in order that all may be plain we will turn aside to consider these principles. The atmosphere is a gas, or rather a mixture of gases. The tendency of all gases is to expand indefinitely, that is there is a ceaseless repulsion between their particles. They are always trying to get farther from each other. Gases are very elastic and compressible. The air is held to the earth by its weight just as water or anything else is. The school books teach that the weight of the air exerts a pressure of about fifteen pounds to the square inch upon the surface of the earth.

Fluids, that is gases and liquids, transmit pressures equally in all directions, sideways and up and down, so that this pressure of the air is exerted downwards, upwards and laterally—in all directions equally. Gases move readily and freely in any direction under unequal pressures. Heat is a very active agent in increasing the mutual repulsion of the particles of gases and consequently their tendency to expansion. When a gas is heated it exerts an increasing pressure upon its surroundings and expands, if not confined, until an equilibrium of pressure is restored. This expansion necessarily reduces the density and consequently the weight of any given volume of the heated gas.

Let us first consider the draft of an up draft kiln. The air and other gases passing through and from the fires become heated and expand in an effort to establish an equilibrium of pressure with the outside air. By this expansion their density is reduced and they become lighter, volume for volume, than the outside air. As a result their downward pressure is not equal to that of the outside air, and they are forced upwards. The common saying that "the chimney draws," or "the kiln draws" is incorrect. The heated gases in the kiln and chimney do not, of their own accord, move forward and "draw" cold air from the outside after them, but the greater weight of the outside air pushes the heated and lighter gases upward exactly as the water pushes a bubble or a cork upward. The escape of vapors so noticeable at manholes of sewers in winter is an illustration of the same principle. Deep mines in winter, and especially in cold countries, ventilate automatically by these principles. Either a current of cold air passes down one of the single shaft and another of warmer air from the mine passes upward on the other side, or a cold current goes down one

shaft and a warm one up another. The interior of the earth being warmer than the surface, furnishes the unequal temperature that disturbs the equilibrium.

So much for elementary principles that to many may seem tedious and uninteresting, but if they will follow on we will lead to those not elementary, that will at least amuse the more advanced. In down draft kilns the same rules hold good, and so long as the kiln walls and crown are air tight the relative heights of the crown and chimney need not be considered. The principle of the siphon obtains here and the laws just stated of gases under different temperatures hold good. In fact, the crown of the kiln might be higher than the top of the chimney and a good draft be maintained. It is the height of the furnace and chimney that are to be considered in determining the head, which produces the draft. It may not be advisable to adopt the practice of building down draft kilns with high crowns and low chimneys, but the point we want to make is, as has been stated, that the height of the crown, other things being equal, exerts no influence upon the draft. For other reasons it has been determined in practice that down draft kilns cannot profitably be built very high, but the limit is not fixed by the height of the chimney.

The head producing the draft or the pressure that produces the draft is equal to the difference in the weights of the column of heated air in the chimney and of a column of the cool air outside of equal height and sectional area.

When expressed in "feet of hot gas it is found," according to Rankine, "by computing the weight of a column of the cool external air as high as the top of the chimney is above the grate and one foot square at the base, dividing by the weight of a cubic foot of the hot gas for the height of an equivalent column of hot gas, and subtracting the former height from the latter."

The velocity of the ascending current in the chimney is the same that would be acquired by a body falling a distance equal to the difference between the heights of two columns of air of equal weights at the temperatures of the outside air and that within the chimney. The formula for determining the velocity of falling bodies is, $v = \sqrt{2gh}$ in which v is the velocity, g the accelerating force of gravity, and h the height. It has been found by experiment that the space through which a body falls freely in one second in the latitude of New

York is equal to 16.0799 feet or sixteen and one-twelfth feet nearly. As the acceleration is equal to twice the space described in the unit of time g , equals thirty-two and one-sixth feet nearly. Now, by letting a , represent the coefficient of expansion of air, h , the height of the chimney, t' , the mean temperature of the air inside the chimney, and t , the temperature of the surrounding air, we can substitute in the formula above and get

$$v = \sqrt{2ga(t'-t)h}.$$

Gay-Lussac found that the coefficient of expansion of air was .00375. For example let us suppose that the difference of the temperatures without and within the chimney to be twenty degrees and the height of the chimney fifty feet. By substituting these values in the formula we have

$$v = \sqrt{2 \times 32.16 \times .00375 \times 20 \times 50}$$

$$\text{Or } v = \sqrt{723.15}$$

Whence $v = 26.9$ feet nearly.

The quantity of mixed gases which is discharged from a chimney in a given time may be estimated either by weight or by volume. By knowing the velocity of the current at any given point and the sectional area the volume of gases passing that point in any given time may be readily determined. With the volume and specific gravity known the weight may be found.

These formulæ are useful, for by them the amount of air and gaseous products of combustion that is discharged from a chimney can be calculated, and since it is known very nearly how much air is required for the complete combustion of a given amount of fuel, it can be determined whether or not the proper amount is being admitted to the furnaces. When any specified amount of fuel is to be burned within a given time the sizes of the various parts can be determined by calculation.

Rankine says: "When either the whole or a part of the oxygen in a given weight of air at a given temperature combines with carbon so as to form carbonic acid, the volume of the mixed gas produced is the same with the original volume of the air, and the density is increased simply in the ratio of the sum of the weights of the air and of the carbon to the weight of the air. When the whole or part of the oxygen of a given

weight of air combines with hydrogen so as to form steam, the volume of the mixed gas produced is greater than the original volume of the air by an amount equal to one half of the volume of the hydrogen taken up. But the hydrogen in ordinary fuel bears so small a proportion to the whole weight that in calculations for practical purposes, the volume at any given temperature of the gas which a furnace discharges may be treated without sensible error as being equal to the volume at the same temperature of the air with which it is supplied. Its volume at 32° Fahrenheit may be estimated approximately at 12½

sary in actual practice for each one to make the calculations for his own particular case, it is true that these well known scientific facts and principles have enabled learned men to determine the relations and dimensions of the various parts. By means of these deductions practical men may be guided in their plans, and by adopting dimensions with reasonable factors of safety they need not err greatly in their constructions. It must be conceded that in practice many difficulties are met that preclude the possibility and advisability of adopting precisely the deductions of scientists.

The efficiency of a chimney is affected by its (1) height, (2) internal temperature, (3) internal diameter, (4) distance from the fire, (5) the facility with which the material of which it is composed conducts heat, (6) surrounding objects, (7) elevation above the sea or mean atmospheric pressure, (8) condition of the atmosphere, and (9) air tight condition. We will take these various headings in the order named and consider them fully:

1. Since the draft is produced by the difference in weight of the column of heated air in the chimney and that of a column of outside air of equal height the natural inference is that the higher the chimney the stronger the draft, but this may be subject to modifications, as may be seen under number 8.

2. As gases expand and become lighter as their temperature is raised, the higher the temperature within the chimney the lighter the contained gases and the greater their velocity or the better the draft of the chimney. This will explain why kilns draw better after they become hot.

3. The internal diameter should be large enough to admit of an easy passage of the gases from the furnace. If the section is too large descending currents may be formed within the chimney on one side. These not only reduce the temperature within the chimney, but take the place, in ascending again, of air that should have been drawn through the fires.

4. Long passages from the furnaces to the chimney are to be avoided, because of their tendency to lose heat and reduce the temperature within the chimney,



W. D. RICHARDSON, SUP'T CENTRAL PRESSED BRICK CO., NORTH BALTIMORE, OHIO.

cubic feet for each pound of air supplied to the furnace."

Such rules and formulæ as those given are of great value in determining the dimensions of furnaces, air inlets, flues, the heights and sectional areas of chimneys, etc. The values of the constants have been determined by experiment and calculation nearly enough for all practical purposes. In this age of mechanical precision and scientific knowledge it is neither necessary nor profitable to guess at the relative dimensions of those things that hold such important positions in the industrial world as furnaces, air passages and chimneys. While it may not be possible nor neces-

thus reducing the efficiency, according to number 2.

5. As the heat within the chimney causes the draft it is of vital importance that this heat should be retained. In order that this may be done the chimney should be built of some material that is a poor conductor, otherwise the heat will be conducted to the outside and lost. Sheet iron chimneys, while much cheaper, are less durable than brick and lose their heat very rapidly, especially in exposed places and cold countries. Thus it happens that chimneys of this kind may be built too high and their great height prove detrimental rather than advantageous. In practice the high chimney built with the desire to increase the draft, presents a large surface, which rapidly loses the heat, which is so essential to the draft, and the higher the chimney the greater the surface exposed.

6. Surrounding objects, such as trees, buildings and hills, may affect the draft by causing eddies and downward currents of air. The best results are only obtained by making a chimney higher than its immediate surroundings.

7. In places much elevated above the sea level the atmosphere is more rare and does not contain as much oxygen per volume as the more dense air of lower levels and greater volumes must be supplied to the furnaces in order to consume a given amount of fuel.

8. The condition of the atmosphere with reference to Moisture very materially effects the burning of fires and the draft of chimneys. In dry clear weather there is more oxygen in a given volume of air than there is in times of fog, rain and consequent lower barometer.

9. Cracks and leaks in chimneys and connected flues greatly reduce their efficiency by admitting cold air, which not only reduces the temperature but occupies space that should be utilized by gases from the furnace. Under this head may be classed cracks in the walls of the kilns, around the furnace doors, ill fitting dampers, and covers of down draft kilns.

In burning kilns of clay goods the conditions and requirements are so different from those of ordinary furnaces that it is not always possible to have perfect combustion nor to utilize the full capacity of the chimney in producing the best draft and complete combustion. In the early stages of the burning it is necessary that the furnace doors

should be kept open and that the temperature should be low, lest the wares be injured by too rapid water-smoking. This low temperature and open doors admitting large quantities of cold air over the grates are not conducive to complete combustion, but tend to produce smoky, smoldering fires. Then, again, the large amount of material in the kiln to be heated takes up the heat of these slow fires and thus tends for some time to keep the temperature within the chimney so low that there is but little heat reaches it to produce a draft.

Another very considerable influence that retards the draft in the early stages of kilns of clay goods is the presence of a large amount of water in the wares. While the ware in the kiln may be considered dry there is always a considerable amount of water remaining that must be expelled. This, with the water contained in the clay as one of the constituent parts of the hydrated silicate of alumina, in being driven off, passes through the chimney. One volume of water at atmospheric pressure at the freezing point expands into 1898 volumes of steam at the same pressure at the boiling point.

Before the heat can be raised above the boiling point of water this water in the kiln must be removed by evaporation. That is, it must be removed in the form of aqueous vapor or steam, and the only place of exit for it is through the chimney. This steam or water-smoke, in passing through the chimney, occupies a vast amount of space that otherwise might be utilized by the products of combustion. By its expansive force this steam holds back the gases from the furnace, and while the chimney is discharging large quantities of mixed steam and gaseous products of combustion, the draft at the furnace is very much retarded and the over-worked chimney is censured and accused of incompetency because of the poor draft at the flues.

Any observing, practical burner of clay knows that great volumes of steam issue from the chimney and that the furnace draft is bad as long as the chimney is filled with steam. He also knows that after the steam has passed away or "the water smoke is off" that the draft is good. Little fault is found with chimneys after the heat is up and they are only required to carry that which comes from the furnace. Evidently, in justice

to the chimney, if for no other reason, the ware should be set in the kiln as free from water as possible.

The sectional area of the air passages through the kiln, and in fact all the way from the furnace to the chimney, should be large enough to permit a free passage of all the air and gases from the fires of the furnace. It may seem superfluous to remark that the air inlets to the furnace, whether through the grates wholly or only in part, should be large enough to furnish a sufficient supply of air to produce complete combustion and thus economically produce the result desired and sought in firing the kiln.

One who is evidently familiar with the subject has truly and tersely said, "The maximum efficiency of a given chimney is attained when all the air that passes up it enters by the bottom of the fire. In this case its temperature is raised to the uttermost by passing through the whole of the fire and the fire is at the same time urged to vivid combustion by the blast thus obtained."

Written for the Clay-Worker.

BRICK AS A BUILDING MATERIAL AND THE TRUE ART OF LAYING THEM.

BY J. W. CRARY, SR.

IN my preceding article on this subject I have treated mainly on the importance of good brick, good mortar, good foundations and good skill in building walls. I will now try to give some good hints about the best way to build brick walls strong, serviceable and economical.

There is seldom an account of a great fire, that does not show fatal accidents from the falling of brick walls, and the injury and displacement of such as do not fall, so as to leave them useless. In most cases, this is the result of faulty planning by the architect, and bad workmanship, though the bricklayer is not in fact responsible, as he is, at least, supposed to be, under the orders of the architect.

PARTY WALLS OR DIVISION WALLS THE MOST IMPORTANT.

If a wall dividing a pair of buildings, or dividing buildings in a row, or dividing two distinct properties be built on true principles, and with proper care and skill, in nine cases out of ten it will stand firm, and in good condition to be used as at first. In all cities the law requires that party walls shall be built to a certain thickness, according to the

height of the building the length of the wall or its fire-proof character, is not considered, and the consequence is, when a hot fire burns out—on one side of such wall, that side must expand and curve and crack, and if there be nothing to support it on the opposite side, the vertical curve will cause the wall to over-hang, so that it will lose its balance and fall.

Now if a party wall be built on a good foundation, and on true principles, the outside four inches of the wall on both sides, will be set off from the inside, three quarters of an inch, so as to leave an air space from bottom to top of the wall, which will act as a non-conductor of heat, and thus prevent to a great, and sufficient extent, the expansion of the wall, so as to seriously injure it. All party walls should be *braced* by *pilasters*, or projections, of at least four inches, not over fifteen feet apart. The face of the pilaster should be equal to the thickness of the wall, and then it should be solid and unbroken from bottom to top of the wall.

STRENGTH IS MAINTAINED AND
TWENTY PER CENT. ECONOMY.

By pilasters in a party wall the thickness may safely be reduced. If we are required to build a party wall, say 18 inches thick, we can reduce it to 13 inches, by carrying up on each side a 4-inch pilaster, 12 inches on the face. These pilasters give the wall more lateral strength, than if it were 18 inches thick, and saves at least twenty per cent. of material.

If it be said that pilasters are in the way, I answer that the space gained between them more than compensates for the room they take, and, further, that they are both ornamental and useful in many ways.

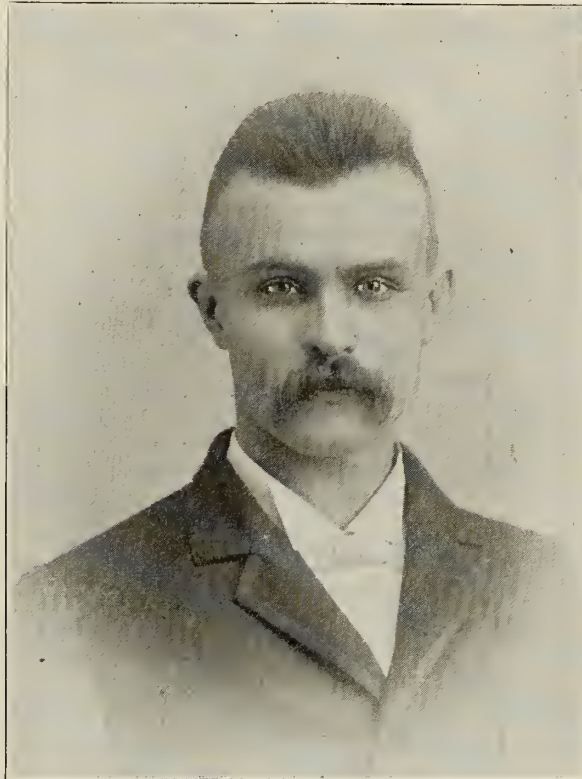
BUILDING WOODEN STRIPS IN WALLS FATAL.

It has long been the habit of architects and builders to lay wooden strips in walls, so that "*furring*" for lath could be fastened. At best, "*furring*" and lathing a brick wall is a violation of true art in building, and is entirely unnecessary, as I will show, but, if it has to be done, the plan of cutting out mortar joints and *wedging* is best. A wooden strip laid in place of a joint of mortar is *botchery*. 1st. It is liable to decay and to shrink, or swell and get loose, and, of course, weakens the lateral strength of the wall. 2d. If a fire burns out the building, the lath

or strip in the joints of the wall, will burn out, and the wall is weakened so that it will easily sway and fall. This is one of the main causes of the falling of walls, during and after a fire.

HOLLOW WALLS ARE DRY AND NEED NO
"FURRING."

Any brick wall can be built with an aperture of three-quarters of an inch between courses of brick, without impairing the strength of it. If a thirteen inch thick wall be built with the inside course of brick set three quarters of an inch from the outer part of the wall, the "bond headers" will have all necessary bearing on the inside of the "front



CLAYTON POTTS, OF C. & A. POTTS & CO., INDIANAPOLIS, IND.

header." If only one brick, or, what is termed a nine-inch wall is to be built, the inside stretchers can be set three-quarters of an inch from outside "stretchers," or, what is better, for dwelling houses, the inside course of brick can be set on edge, and three courses high will be equal to five courses on the "*flat*," which makes every sixth course a "header" or "bond course." This plan gives ample air space to prevent heat, cold, or dampness, coming in from the outside and the wall is just as strong as if it were solid. In building nine-inch walls for houses, the "jamb" of the doors and windows should be a brick and a half or 13 inches thick, and if doors and windows are placed so as to

admit of it, the "jamb" should be started as "pilasters" and carried up from bottom to top of the walls; this gives great additional lateral strength to the walls, takes but a trifle more work, and material, and gives ornateness to the finish of the rooms. A three-story dwelling can be safely built in this way, with a saving of 16 per cent. of brick and mortar.

OBJECTIONS TO "FURRING" AND "LATHING."

First, the cost; *second*, liability to decay; *third*, it makes a harbor for rats, mice and bugs; *fourth*, it takes up room; *fifth*, it impairs the strength of the wall, for the reason that it is not plastered, which, when done, on the brick, gives strength and permanency to the building.

CONSTRUCTION OF SMOKE FLUES.

One of the greatest evils in brick work, is the careless, imperfect building of smoke flues. There should be no sharp angles or turns in a smoke flue. It should be uniformly and smoothly "*pargeted*," and no offsets should be left where mortar can lodge and *choke* the flue, and all smoke flues should be at least six inches from any wood work.

Now that terra cotta is cheap and easy to get, it should be used for smoke flues, whenever and wherever practicable.

SETTING JOISTS AND SIMILAR BEARINGS ON A WALL.

It is a common error to "set and anchor" joists in a wall, so that when a building happens to burn, the joists fall, and pull a part or all of the walls down. Joists should be so set and fastened to the wall that if they burn out and fall, no damage is done to the brick work.

There are so many simple ways of doing this they will suggest themselves to the builder. In fact, there is very little added to the strength of brick work, by fastening wood work to it. If brick work be well done, on true principles, it needs no bracing up with anything, and nothing should be fastened to a brick wall that would endanger it in case of fire, or overloading the floors.

I have finished this series of articles, and trust that I have given some hints and facts that will benefit those interested. My sole object in writing these articles, was to help and encourage economical, good brick building. I do not claim to know all that can be known about brick, though I have been *in brick*

over sixty years, the field for thought widens, and I am yet a student. A perfect brickmaker would be a sight indeed.

Written for the Clay-Worker.

HINTS ON BRICKMAKING.

No. 59.

BY. R. BRICK.

HOW TO BUILD A PERMANENT BRICK PLANT WITH SMALL CAPITAL.

A MARKET for the product is the first consideration. There should be a home market for a large portion to insure success. Where it is necessary to ship fifty or a hundred miles to market bricks must be sold at a low price at the works, as freight added makes them high to consumers at that distance. This applies especially to common building bricks. In locating a plant the local demand should not only be prospective but present. There are "boom" towns that advertise for factories that *intend* to use ten millions of brick in their *contemplated* improvements. The writer has known of several instances of this kind where men were induced by false representations to invest their money in a plant, only to find in a few months no demand for his products, and worse, no prospects for any future. Always let the brick plant follow a healthy demand for it. After this point is settled comes the selection of an ample supply of clay favorably situated. Get a two-inch auger, weld to the shank a three-quarter inch iron rod two feet long, cut threads in the end of this, then with a coupling attach a one-half inch gas pipe five feet long, on the other end put on a T, then screw two pieces of pipe each eight inches long into the T, forming a handle to your auger, with this bore your test holes. Turn the auger until it sinks six inches, then withdraw it, clear the auger and continue to do this until you have gone down the length of your rod. If you wish to sink the hole deeper than six feet have another joint of pipe five feet long, and with this splice the rod as you go down, a hole can be drilled in this manner twenty-five feet in depth. A complete record of each strata can be kept, each hole being numbered and a stake driven down by it; with this memoranda and numbered stakes, a map of the clay bank with a complete record of the kind and thickness of each strata can be made, so that you know just what

your clay bank contains. Would recommend running lines of holes one hundred feet apart, and run parallel lines one hundred feet distant from each other, this will be a sufficient record for practical purposes. This can be accomplished in a short time and at small expense. Two men can operate the auger. If there is more than one bed of clay select the bed that gives best facilities for shipping the clay, and bringing fuel and supplies to the works.

Another thing to be kept always in view is suitable site for the plant near the clay deposit. Drainage is another essential feature for both plant and clay bank. The latter should have fall sufficient to drain the clay to the depth it is mined, in order to get rid of surface water as well as water rising from the bottom in wet seasons. A large ditch should lead from the lowest point in the clay bed to some stream near by. The clay should be taken first at the lowest point, then used gradually, so as to keep the bottom comparatively dry. Then the yard or dryer should be located by all means *above* high water. Never build your plant where the highest flood will reach it; the risk is too great, and it will lessen the value of the plant if it is subject to overflow. It is a well nigh fatal mistake to get into the water with your brick kilns and dryers. Don't do it. The proper time to begin making bricks on a new plant, where no artificial dryers are used, is the early spring.

Now we come to the point of equipping the works in the most economical manner, always bearing in mind that this advice is given on the basis of limited capital. To assure success, however, there must be a few thousand dollars capital, to begin with, not only enough to start the machine making bricks, but a surplus to pay for making and marketing one or two kilns at least, so that it will not be necessary to borrow money before the business is fairly begun.

To make a good beginning it is best to have a machine for molding the brick and sufficient steam power to drive it. The first thing to determine at this point is the kind of machine to put in. It is best here to consider the opinions and prejudices of our customers with small means. It is not best or safe to undertake to educate the public to the kind of brick they should buy, as the tuition fees might absorb our little capital. If our prospective patrons are accustomed to hand-made bricks with

sand surfaces, best get a soft mud machine. It is not necessary to name them. The CLAY-WORKER will tell you all about all of them that are worth considering. There are a few standard machines of this class, and all good, and will make from twenty-five thousand to thirty-five thousand per day. Take your choice. If, however, your patrons are accustomed to stiff clay brick, then by all means get a stiff clay machine. These will require more steam power than the others, but other advantages they give will more than balance the extra power required. Of these machines there is a great variety, making from twenty thousand to sixty thousand bricks in ten hours. Of the stiff clay machines there are three kinds; those that make bricks in a mold and have a positive delivery, of certain number of brick per minute, according to speed of machine; another known as plunger machine, pushing out a block of clay which is cut by wires into bricks; then another class that deliver the clay also in a block and is cut into bricks by wires. The first is driven out by a plunger through dies, the stream of clay being at rest while the wires separate the block into bricks. The latter drives the stream of clay by propelling augers through the die. In this machine the stream is continuous, the cutting being done while the clay is in motion. For a brick plant where capital is limited these two classes of machines, namely, soft and stiff clay machines only need to be mentioned. In our next article will be considered size of engine and boiler necessary, also clay preparing and hoisting machinery, sheds and drying yards.

COSTLY METALS.

Platinum is now at an equal price with gold, or is worth its weight in gold. Palladium which is a white metal used in some parts of timepieces, is worth \$500 per pound. Osmium, the heaviest metal known, is \$625. Iridium, which is used to furnish the "diamond" points of gold pens, is about \$700. Vanadium costs \$1,875. Rhodium can be bought for \$2,000 and Niobium at the same price. Yttrium is quoted at \$2,250, and Beryllium at \$3,375 per pound. Barium, which is found only as a fine powder, commands a price of \$3,750, and Dedy-mium is called worth \$4,500 per pound. But only a few of these are used for practical purposes excepting those for which the use is named above.

Written for the Clay-Worker.

PRACTICAL BRICKMAKING.

BY ED H. CALLAWAY.

MUCH has been written and said on the subject of brickmaking, and of clays and their utility for brickmaking purposes. Many theories have been advanced in this direction and many have been refuted by dearly bought experience. There are theoretical brickmakers and practical brickmakers. The latter class generally make the money and the former reap the experience and sigh at "what might have been." It is not the intent of this article to condemn theorists, but to present as concisely as possible the practical side of brickmaking.

Theorists as a rule wield a facile pen and present their side of a case in a fluent manner, while the practical men are too much engrossed in business affairs to devote any time to essays, treatises, etc.

Practical brickmaking means:

1. Understanding clays.
2. Knowing the proper method to manipulate different clays.
3. Obtaining the right kind of machinery for that method.
4. Arranging the machinery and constructing the plant so as to produce the most economical results.
5. Knowing how to burn.
6. Good business management.

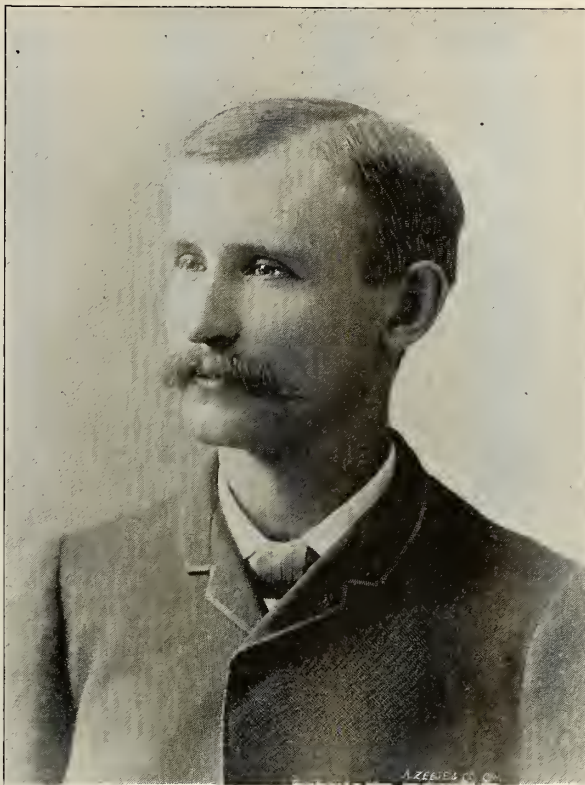
KNOWING CLAYS.

The first head, "Knowing Clays," is vast in its comprehensiveness.

This article will only deal with the practical part of it, i. e., the practical tests of clay, and there is only one reliable, never-failing, practical test as to the brick producing qualities of clay, and that is to prepare or temper the clay thoroughly, mold it into bricks, dry them well, place them in a kiln and burn them carefully, and the result of that burn will determine the character of bricks that particular clay will produce, or whether it is fit to use for brickmaking purposes at all. Chemical analyses are good in their place, i. e., to determine the general nature of the clay, but burning, and burning only, will determine the character and strength of the bricks the clay will produce.

There is a good reason for this. Clays are as variegated in their composition

as the face of nature. The basis of all clays are silica and alumina, in greatly varying proportions, and with the silica and alumina is found in equally varying proportions, iron, lime, potash, magnesia, soda, sulphur and organic matter, with their various combinations and and dozens of other "side issues." There are no two clays in which the component parts are identically the same; the ingredients may be "free" or be "combined" with other ingredients, and the possible combinations, on account of the variation in the nature and proportion of the component parts, are as innumerable as the combinations of the multi-



ALBERT POTTS, OF C. & A. POTTS & CO., INDIANAPOLIS, IND.

plication table, and the result of these combinations can only be ascertained by the process of burning.

The chemical action taking place, while the clay is being burned and cooled off, is caused by the heat and gases generated by combinations of the fuel in the furnace and the gases thrown off or generated by the different chemical combinations in the clay, and as the heat differs, and the fuel differs, and the chemical combinations in the clay differs, it is impossible to accurately foretell the result of this chemical action. If the proper care is taken in making this "practical analysis" of the clay before erecting a plant,

there should be no danger of a failure.

KNOWING THE PROPER METHOD TO MANIPULATE DIFFERENT CLAYS.

The second head, "Knowing the Proper Method to Manipulate Different Clays," is equal in importance to the first though not so comprehensive, and a mistake in the method of manipulation of the clay is not necessarily fatal, as it can be rectified. Too much care can not be exercised in the preparation of clay before it is made into bricks, and especially is this true of refractory clays. Many failures have been caused by the want of proper preparation of the clay. A practical brickmaker should not become wedded to any particular method, but study his clay and adapt the method to it. The nature of the clay can't be changed, but the method can. After the nature of the clay has been ascertained and the methods of manipulation decided upon, comes the third head,

OBTAINING THE RIGHT KIND OF MACHINERY FOR THAT METHOD.

This requires experience and a thorough knowledge of the different classes of machinery in use for that purpose. No brickmaker should put in a machine until its adaptability to his particular clay has been thoroughly demonstrated by practical tests. Anyone who says that he can tell what clay will do by looking at it and tasting it admits his ignorance, and is not a safe party to construct or operate a brick plant. The more experience a man has had the more careful he is in giving his opinion. This applies not only to brickmaking but to all walks in life.

The fourth head,

ARRANGING THE MACHINERY AND CONSTRUCTING THE PLANT SO AS TO PRODUCE THE MOST ECONOMICAL RESULTS,

Can not be given too much consideration. The machinery should be carefully and skillfully arranged with a view to saving labor in operating it and reducing the friction to the minimum, thus saving power, which means fuel. The plant should be substantially constructed in order to save wear and tear and cost of repairs, a few thousand dollars additional cost in construction, is a far better investment than \$2.00 or \$3.00 per day in wear and tear and repairs.

"Makeshift" brickmaking has had its day, and the brickmaking plant of the future will be on a par with any other first-class manufacturing establishment, and will be constructed by skilled engineers and mechanics, and operated by practical, level-headed business men seeking profitable investment for their capital.

The fifth head,

KNOWING HOW TO BURN,

Is as important as any link in the chain, for it matters not how good a clay you have, nor how perfect your machinery, nor how good a brick your machinery turns out, unless it is well burned it is worthless. Burning requires good judgment, close attention, a

dusty, for it is destined in the near future to rank among the leading industries of our great and glorious country, and may the sun of prosperity ever shine upon it.

HANDY BUT PROFLIGATE HUSBAND.

When the late Rev. Henry Ward Beecher was pastor of the Second Presbyterian church in Indianapolis it was fashionable among the best families, during the fall months, to shake with the ague one day and go about the next as if nothing unusual had happened yesterday and was sure to happen again to-morrow. Going home one day, Mr. Beecher found his wife in the midst of a shake, with a batch of dough half

were many callers from the class who were improving the off day in making calls, according to the code of the period. Mr. Beecher being proud of his achievements as a baker, had to show his plate of cakes to every successive caller, and ask them to sample them, which they were always ready to do on an off day. The result of this profligacy was, not a cookie left for his hungry sick wife.

DOWN IN JERSEY.

The brickyard shown in accompanying illustration is one of the principal yards at Hackensack, N. J. It is owned and operated by Mr. Jas. W. Gillies. Anyone who looks over the yard can see that he is a thorough brickmaker.



good knowledge of heat and experience with the class of kiln that you may be using and the particular clay that you are burning; without these qualifications in your business it is all chance, therefore a good burner should be well paid and given all the encouragement possible.

It is useless to comment on the sixth head,

GOOD BUSINESS MANAGEMENT,

For without it no establishment can prosper. It is as necessary to the success of a brickmaking plant as to the iron mill, or cotton mill, or railroad, or any commercial establishment, and practical business men should be encouraged to enter the brick manufacturing in-

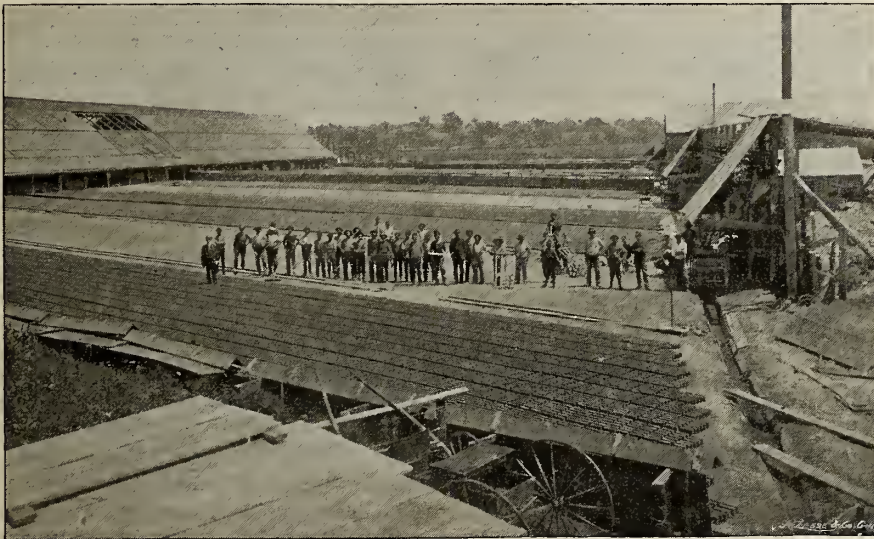
kneaded in the bread tray, so sudden and imperative had been the call to fashionable life. He took in the situation at a glance, and, under the directions of his wife, given between paroxysms, he kneaded the bread, put it into the oven and, in due time, took it out done to a turn. She then lamented the inopportune call to shake, as she had planned to have some cookies for supper. "I can make them," said the boastful man who felt equal to any emergency, and at it he went, Mrs. Beecher giving directions as well as she could between shakes, and sure enough the cookies came out all right, and the sick wife anticipated a good supper, after the fever should be off. That afternoon there

Everything is in first-class condition. He says he came to the conclusion that men could not do a satisfactory day's work when trucks and wheel-barrows were out of order, machines breaking down for want of proper repairs. He believes in the maxim of "A place for everything, and everything in its place." He is ably seconded by his superintendent, Mr. Silas Gardner, who, I must say, it is a pleasure to meet. He is a gentleman of wide experience in the manufacture of brick. I, also, found, that he was conversant not only with brick, but with the leading topics of the day. He kindly accompanied the writer over the plant, giving some very interesting information in regard to it.

As we walked through the shed he told me it was over 400 feet long, with a capacity of 96 arches of fours, with 43,000 brick to the arch. The output of the yard for the season is 8,000,000, and at the close of the brickmaking season of 1890, there was 90 arches under the shed. I thought why was not I a "brick baron" so that I could have sixteen thousand dollars lying in stock instead of being a scribbler for the CLAY-WORKER. Such is life.

There are three yards to a machine. They start at sun-rise in the morning, and get the pits out at ten A. M., using two pit shovelers, one sander, one molder, five truckers, one dumper and a hand boy.

The yards will lay 292 molds long, 13 rows to a pit, turning out 23,000 green brick, two hacks eleven high hold each pit.



There is a 100 H. P engine with four Ver Valen tub machines, or as was explained to me, "Sod pits." It is the only yard in this vicinity that does not use tempering wheels. It requires a great deal of oversight when the machines are running to see that the pit shovelers get the clay and sand in the tub properly, as the clay is hard and stubborn and the sand is fine. Mr. Gardner explained to me that the reason of making brick by that method was because it did away with the tempering wheels, thereby making brick cheaper, and I should judge by the burned brick under the shed, a perfectly satisfactory article. They are hard and a good red color. The clay is taken out of the bank just behind the yard. No steam shovel is used there. The clay

is transported to the pits by horse and cart. The sand is on top of the clay. There is a pump to keep the water out of the bank and an extra one to use in the spring, as the accumulation of water in the winter is of some volume. There are six horses used on the yard, and when running up to full capacity, 65 men are employed. There is an abundance of the best molding sand on the property.

As I stood looking over the yard thinking of the different plants it had been my lot to see, with their expensive machinery, I came to the conclusion that the "Sunshine" principal was good enough for me, if I ever invested in a brickyard, and I think it would be hard to find one that would beat Mr. Gillies.

Mr. Gardner said: "There is an essential adjunct to the yard that you have not seen. We will walk down the

there was a vessel over 100 feet in length, 30 feet beam with 8 feet sides, carrying her load all on deck. The brick were piled in rows, one on top of the other, 16 high. "Where does she take them?," I inquired. "To New York, and as all our stock is shipped by water you can see that a barge is a very necessary article to have," was his reply. The accompanying sketch shows how the brick are wheeled on board.

Thanking Mr. Gardner for his kindness, I bade him good-bye, well pleased with my trip to Hackensack.

A SCRIBBLER.

ALL ARE INVITED.

Looking over the CLAY-WORKER of November 15th, I see a notice of the 6th annual meeting of the National Brick Manufacturers' Association to be held in Washington, D. C., in January next. I have a high appreciation of the value of such an Association, and would like very much to attend this meeting in Washington. But I am not a BRICK-MAKER as yet. It is now nearly two years since I first wrote you, subscribing for your valuable journal, and asking you to put me in the way of getting information in regard to the manufacture of brick; as I had in contemplation the manufactory of brick from ground slate and soapstone.

The CLAY-WORKER has been of great value to me as well as of interest. Our plant will soon be ready to start, in fact, we started our machinery last week, and within twenty days we will be able to turn out 20,000 a day, and by the 1st. of June we can make 100,000 a day if the market will take them. I am simply starving and thirsting after information on the subject of BRICKMAKING in general.

I have spent a large portion of my life in the manufactory of Charcoal Iron, and as you know such plants are situated in sparsely settled country in order to be near the timber; I often felt the necessity of consulting with those engaged in the same branch of business, and some fourteen years ago I was the means of organizing an Association, called The U. S. Association of Charcoal Iron Workers, and we have met from year to year in various parts of the United States. No one can estimate the advantage this association has been to our branch of Iron business, and the object of writing is to know if I would be eligible to membership and if so what is necessary to be done. I will be greatly obliged to you for the information.

Truly Yours,

J. C. FULLER.

yard to the place where the men are loading the boat." As I looked at the way the men worked and compared the way they worked to the way I had seen the brick handled at other yards, I came to the conclusion that the other yards were not "in it," with their four brick at a time. Here there was a man on top bench, one in the middle, one in the bottom and one on the stage, with six wheelers, taking six brick from the tosser as fast as he could send them down. I said to Mr. Gardner, "How long will it take those ten men to load that vessel?" He replied, "About a day and a half, and, it has been done in less time." "How many thousand does she carry?" was my next query. "Two hundred and fifty thousand," was his reply. We stepped out on the dock and

RED BRICK CLASSICS.



CLASSICS in red brick?

Why, yes, why not? Is it so strange that the subtle element should be found in a brick building? It would be, indeed, were the aesthetic and artistic elements

synonymous with the classic. But we know that this is not the case. The palace of a modern Croesus may be as beautiful, architecturally, and as satisfying as money and culture can make it, and yet not be a classic. On the other hand, you pass daily scores of somewhat ancient buildings, in this city, that are veritable red brick classics; buildings with a character. Mme. De Stael said: "Beautiful architecture is frozen music."

And so it is, but the truest music is the music that has the most character. So the building, whether it be architecturally beautiful or not, is frozen music in its best sense when it has associations clinging about its halls and turrets, as the English ivy clings about its sills and cornices.

I like to see one of those cool, shady, mellow, ivy-embowered brick dwellings so common in this city. Some have swell fronts, and some haven't; some effect flat, while most have the old-fashioned peaked roof—but all alike are suggestive. There are some of these houses, a solid block, in fact, on one of the streets on Beacon Hill. They are not all vine-covered, it is true, but they are ancient, solid, truly aristocratic. As true aristocracy is conditioned by the head, and not by the pocketbook, so these houses owe their claim to be placed in that category to the human lives which hallow them; to the atmosphere of actual refinement which surrounds them.

Why a swell-front brick house should be any more impressive than a flat one, it is not easy to see. That the former is so, is evident to any close observer. It is not because they thrust themselves upon the vision, for that very obtrusiveness tends to detract from their impressiveness. Neither is it merely because of contrast, they being curved and their neighbors flat. It may be owing to the fullness of plentitude which they suggest; that air of portly contentment and reflection that we are wont to observe in the stout man in cool weather. Their full-bellied and glowing fronts are, then, suggestive of that hospitality vaunted as

Southern, and, unlike the discomfited condition of the stout man in warm weather, that comfortable air is maintained throughout the year. True, they "sweat" under certain conditions of the atmosphere, but that is not prominently apparent; and if it were, it would only go to prove that bricks have a certain amount of vitality, and that they are not incapable, at least, of the function of elimination.

This endowment of the bricks with a sort of life unrecognized by science is not an unwarranted thing. They have an element of life, quiescent, but yet existing. Is it not significant and complimentary to all bricks since the world began, that a celebrated general once referred to his soldiers as not only good soldiers, but

—every man a brick!

Bricks are useful and charitable in an alimentary sense, for do they not furnish the ivy-green with food? Dickens sings:

Of right choice food are his meals, I ween!

Not only this, but what a bulwark they are to the human dwellers within their walls against the blasts of January.

The bricks and mortar have their critics. Oh, yes, brick-and-mortar critics, of the prolix, mortar fellow kind, with heavy invectives against the endless bricks and mortar, the very endlessness of which they seek to emulate in words. But still the brick flourishes, all unconscious of the incongruity in the world of a flourishing brick. The millions of bricks, fixed for years in their soldering mortar, are a healthy and a useful conclave. Wherever they may be, in whatever combination they may be mortared, they are generally the same invariable, red-faced, merry brick. Another incongruity, say you? A merry, red-faced brick? And why not? Wouldn't you be if you had thousands of red-faced, congenial companions around you? And who knows but that bricks have mysterious communication.

A brick in itself, sure, is nothing much. It is only an oblong square of burnt clay, but, like many human bricks of insignificant appearance, it has its ancestry. Bricks, in truth, were of very early origin. You know just before the confusion of tongues the people said:

"Go to, let us make brick, and burn them thoroughly." So, too, bricks were anciently honored, for Isaiah speaks of the people that

—burneth incense upon altars of brick.

But the innocent looking modern bricks had some exacting ancestors, for,

in speaking of the children of Israel, it is said:

"They made their lives bitter with hard bondage, in mortar and in brick."

So, too, in these later days, the bricks exact a certain amount of toil from the



sons of Ireland, who elevate them to conspicuous positions.

But what shall be said of the down-trodden brick, of the brick that for years past has lain, and for many future years shall lie, in ignoble fellowship along the sidewalks of the great city? Thus the bricks are antetypes of the unfortunates in the great human family.

The brick has many an unusual experience, and is, indeed, not always a merry brick. Sometimes it grows redder in the face than ever under the glow of Mynheer's bake-oven; or it freezes along the cold and draughty heights of some tall chimney. Now we find him enclosing the worshipper at his devotions, and anon he is found entombing that same worshipper after he has become quiet in the chill grasp of the great Angel. Here we find him built into some miniature Chinese wall in the city, and there lining the cool depths of the abode of truth.

There is surely mind in matter, that is, incorporated with matter. This being so, then, why may not even so unpoetical a thing as a brick have a kind of thirteenth rate soul? Why not, O reader? If there are

—sermons in stones,

surely such an artistic conception as a "brick stone," as a German friend of mine called a brick not long since, has a tale to convey. We have Scripture for this. See Exodus, where it speaks of

—the tale of brick.

If no extract of brick can be made, it is because a brick is too self-contained for the process. But how childhood triumphs over the seeming impossibility

of ever making any artistic use of the brick other than architecturally. Like as in many other things, juvenile minds have probed into the possibilities of pulverized brick as a pigment. Do you not remember in your boyhood days of longing to paint, a sort of red-paint mania having seized you? and how you have then procured a hammer, a fragment of brick and a saucer of water? Then you have powdered the brick, have mixed it with water, and lo, your supply of red paint was at hand. If you never paint red in a less innocent manner than that in your childhood days you will do well.

Speaking of bricks as used anciently, reminds us that in Chaldæa, where stone are not plentiful, sun-dried bricks were much used. They were also kiln-dried, and these bricks were so durable that in less exposed parts of the ruins of the ancient buildings they can be found to-day as laid in walls and buttress 4000 years ago. In size they are large, the side surface being a foot square and the thickness two inches. Think of Chaldæan Patrick dropping a load of such foundations on your head. The color of the bricks was yellowish, dark blue, and sometimes pale red. How the walls of the ancient Chaldæan cities must have glowed. All the bricks, however, although they were usually colored, were not of the same large size. The sun-baked variety was sometimes only six inches square and two in thickness.

But the finest and most durable bricks were used for the structures of mighty Babylon. The walls of these buildings were of enormous thickness, and were painted with scenes from the mighty chase and the fight, being seldom carved. In fact, the Babylonians were no less adepts in their brick decorations than in their brick manufacture. They favored a yellowish or bluish tinge, and



sometimes the bricks of the latter tint were almost black. But the softer sorts were often red or black. A peculiarity of the Babylonish brick was that it was usually stamped on one side with a

monogram of inscription. This was sunk below the surface, so that it should not be injured in handling.

The buildings themselves were huge and impressive, and the system of stamping and monogram-inscribing must have heightened their effectiveness.

In Egypt, ruins of great brick buildings are found in all parts of the country. All but the temples themselves were of crude brick. It is curious to note that more bricks are found bearing the name of Thothmes III. than of any other period, which would go to prove that the august Thothmes himself was regarded by his subjects as a brick, or else he had an unusual monopoly in bricks. The making of bricks was, in fact, a government monopoly, all products of that industry being stamped with the name of the king.

In later times, the material used by celebrated builders has been brick. It is said of Palladio, the Italian architect,



that some of his finest examples are of brick.

The brick, even, has a place in literature, for Thackeray uses the phrase: "He's a dear little brick!" and we have numerous brickish phrases, as, "It decendth like a thousand of brick." How often, too, at midnight, or early morning, may be seen the unfortunate reveller,

Whose misfortune lies in the fact
That he has a brick in his hat.

Thus the brick has manifold experiences and uses, and, after all, has a right to exist. It paints the town red, but that is because it is so numerous, and not because of any mischievous intention.—*L. M. Lowe in Household Companion*

The *Cosmopolitan Magazine* has undertaken to solve the problem of aerial navigation, and will bear the expense of experiments to make it practicable. If successful, no patents will be taken out, but the results will be given to the world. Experts and scientists will be employed, and at the same time prizes are offered for essays upon the subject.

Written for the Clay-Worker.

BRICK AND TILE MAKING IN FRANCE.

NATURALLY enough our American clay-workers are anxious to know "how it is done" elsewhere. The American clayworkers are a great deal more anxious to know about the details of clayworking plants in France than are the clayworkers of France of the details of clay work in America. This means that the French have more to learn from the Americans than the Americans have from the French. It is those who are content with their own methods who are most in need of information. Their clayworking methods are like a good many other of their manufacturing processes, quite clumsy. They do not like to experiment. The reason for this is simple enough. Competition is closer and the rate of interest lower than with us. All fields of enterprise are fairly well filled and the earning capacity of none is much above the ordinary rate of interest. Therefore experiments are a serious matter. If one fails, it means wasted capital with only a chance of securing it by farther experiment, which may succeed. Again, the French people are exceedingly economical, very prudent and very shrewd where money matters are concerned. This leads them to refrain from all expenditures in which there is not a reasonable certainty of an immediate return. This conservative, frugal spirit, the crowded condition of all of their industries, the low earning capacity of their investments precludes experiments.

Thus we find the brickmaking industry and a great deal which has to do with clay work not in an advanced state when viewed solely from a mechanical standpoint. Not but that their work is well done and the character of the product very high; there is no question as to the excellence of the result in this way. But the methods are not up to our standards. We could not do business according to the general principle or by the same methods and market our products profitably at the same cost that we are now doing it. I judge that the American clayworkers are all interested in good results. Thus far they will be interested in French products, but in that the mechanical methods are inferior to ours and the physical results not superior, I think it is fair to say that we have very little to learn from them which may be taken to our yards as a profitable part of the business.

Competition is of a different character

with these people from what it is with us. It does not seem to greatly effect prices. If we could transport some of this spirit it would probably be well for many of us. As I think that I understand why these people are not effected by the spirit of competition in the same way that is so usual with us, it may not be out of place to say a few words about it. The question is very simple. They know all the time exactly what their products are costing them; they know every day what they are getting for them, and hence they have the gain or loss constantly before them. There is as much book-keeping necessary to run a French brickyard or clayworking establishment as is common with many of our banks, and in some instances, I am sorry to say, with results eminently more satisfactory. This book-keeping spirit is one of the French characteristics. It is one of the general systematic qualities which belong to the people as a whole. With a certain knowledge of what they are doing in a business way at all times, with the positive information as to all costs as well as the income, their is not great danger of ruinous competition.

Competition which entails loss comes about more often through ignorance of just what the loss is than through anything else. A brickmaker who does not know what his brick are costing him a thousand is much more apt to sell his products at a loss, or without profit than one who is fully aware of all costs connected with their manufacture. It is an unfortunate fact that those who are not fully posted as to the cost of their product always under-estimate it. They

wish to think that the cost is really lower than it is, and the hope is father to the thought. If one is ignorant of the cost of his product, in making a mental calculation as to its costs or one without sufficient data, he is sure to omit something, and for this reason under-estimates the cost. However, with the systematic methods of the French people nothing is forgotten and nothing omitted. As a result one never meets with the competition which entails a loss, or even business without a fair profit. Where one knows exactly what he is doing and can count his profits it forms a tendency in him to increase his prices rather than diminish them. The exact realization of gain has a tendency to make one wish for more, and in that way the general spirit of ruinous competition gives way to a spirit looking to increased profits.

In this idea I think we have quite as much to gain from these people as from mechanical methods. It has happened in the history of trades and trade organizations that the mechanics of the business have gone ahead of the general mercantile feature, so that the strictly business end of the work has not had the same high and skillful attention that has been given to the mechanics.

* *

The better class of building bricks contains quite an admixture of fire clay, which makes them exceedingly hard and of a most excellent quality. However, one rarely sees a fine red brick for fronts which compares with the better grades of those in use in America. The color is inferior, the edges not so clear and sharp, nor are they in any way so well adapted to good work as with us. This statement will apply to pressed brick and emphatically to the common brick in use for ordinary building purposes. Molded brick and decorative brick one does not see. However, the excellence of their product is shown in the manufacture of a good common grade of interior building brick, a common form of hollow brick for partitions, for the filling between iron eye beams and around iron columns. The presence of the fire clay or a closely allied material renders them very hard.

This quality of the clay in general use helps to develop an impervious brick, an impervious clay work for roofing tiles, flue linings and other material. The clay is worked drier than is common in many of our yards in the manufacture of all of the higher grades of

products. I have seen some cases where in the smaller and finer grade of work the clay was so dry that it did not show moisture excepting under pressure. This is particularly true of the hollow tile work and especially in the case of roofing tile. However, even in the manufacture of this material the so-called dry process is not unusual. It is said, however, that the proportion of waste in burning is less in the case of the dry process than with the usual method, more common with us, of working wet, drying and then burning. It is the theory that much of the waste is due to warping because of insufficient drying before being fired in the kiln. It is assumed then when clay is relatively dry that the process of firing is not such a shock to the material; for which reason it effects much less change in its form and consequently much less waste.

I have written this in obedience to a suggestion in a communication from Mr. R. M. Greer from Tuxpam, Mexico. The tile which I illustrated since my letter in the September issue is the tile of which Mr. Greer speaks, that is, the one made by the Societe General de Tuileries of Bordeaux. I have no doubt Mr. Greer has seen these later drawings which cannot fail to make clear the points of which he speaks. I recognized that my descriptive matter in the September issue was not sufficiently clear, and secured tiles of the Bordeaux manufactory and made drawings of sufficient accuracy that a pattern could readily be made therefrom. This tile, like most of the others of France, is made from a clay strongly impregnated with what is known with us as fire clay. It is first



PRIMER FOR A CHI-CA-GO ED-I-TOR!!?!?

Is the cur mad? No, he is not mad. Then why does he howl so dis-mal-ly? Be-cause he has the lit-er-a-ry mange. What caused it? A con-stant di-et of paste and scis-sors. Is it cur-a-ble? not in his case.



A CHANGE OF DI-ET.

Has the cur a change of di-et? Yes. Then why does he still howl? Be-cause of the per-ver-si-ty of his eur na-ture. He is now howl-ing be-cause he is not far e-nough in the soup. As us-u-al he has suc-ceed-ed in get-ting un-gled up with him-self.

worked out from the machine in strips of proper size to be put in press and there stamped into proper form. That is, the clay is first discharged from a machine in broad, thin sheets of sufficient width for a finished tile and of continuous length, being cut off, and, in some instances, slightly dried before it is stamped. The interval between the first and second process allows the clay to dry out somewhat, and thus brings it to the press in a better condition for final pressing. It is needless to say that all of the clay is thoroughly ground and disintegrated before being run out at all.

Again, it is a habit of all lines of clay-workers in this country to leave as little to the judgment of their employes as possible. The proper kind of clay being determined, and their various proportions known, there is not the slightest variation therefrom. The work is done by exact weight in order to determine the proper proportion of the admixture. Then the best known mechanical operations are carried out in exactly the same way every time, without regard to any one's judgment except that of those in full charge of the work, every machine is worked in the same way all the time. The men are machines and the same result and the best result possible from their efforts are secured, without variation.

In the particular manufacture of which I speak, while the clay is not absolutely dry, it is more nearly so than is common with us where the ordinary wet process is used. It is quite as dry as it is possible to work it through a mill in discharging the sheets preparatory to preliminary drying.

As to the shingle tile: Mr. Greer says he is not clear as to just what my idea of a shingle tile is, and asks if I mean one like the Indianapolis tile with the overlap and lock. I did not have in mind that tile when speaking of a shingle tile, but one is laid on a roof a good deal like a shingle or a piece of slate, that is, with the same proportion of bond though not the same large amount that is used on a shingle or slate roof, while I am inclined to think that the Indianapolis tile will make a good roof. I would not call it a shingle tile. The name is certainly improperly used in this connection. The shingle tile proper, as I understand it, and as it is classed, is the same that was illustrated in my first articles on this subject.

LOUIS H. GIBSON.

Paris, November 27, 1891.

NOTES OF TRAVEL.

Friend Randall:

I am on my way home from a business trip in which I visited "R Brick" at Rome, Ga. The phrase, "All roads lead to Rome," originated in the fact that there is but one street *extending through the city*, and, naturally, all roads lead into it. "Rome that sat on her seven hills" may have been a correct description once, but it is not now. The whole country for many miles in every direction is hills, and Rome sits on just as many as she can cover. It is a beautiful country. The climate is so mild that you will see bare-legged and bare-footed children in the streets, and yet, strange to say, aside from a few pine-covered hills, cane brakes and mistletoe, you can see very little verdure. The grass is more green to-day in Ohio and Michigan than in Georgia. It strikes me that Nature is much more lavish of beautiful colors in our fruitful North. I have seen nothing more grandly beautiful than the forest covered hills of Pennsylvania when touched by the early frost. But I do not intend to make comparisons between the North and the South. No one knows where the North ends and the South begins. The lines were swept away by the late unpleasantness. Our people are so near alike that I wonder that there ever was such cruel strife between them.

But I must confine my thoughts more to the objects of the CLAY-WORKER—the good of the trade and things pertaining thereto. There are some lessons to be learned from the works and management of the Rome Brick Co. The president, J. R. Camp, is as active and energetic as a young man. He holds the purse strings and makes all purchases. H. H. McClure, secretary, keeps all accounts and makes all sales; and R. B. Morrison, superintendent—"R. Brick," our brick—has management of store and works. Mr. D. E. Hall, the engineer, has charge of all machinery and shows skill in repairing and keeping it in working order. Mr. A. H. Camp is the foreman, and manages his colored workmen very quietly and effectively. Major Wright attends to the emptying of kilns and loading of cars. There appears to be no clashing between these different foremen, no loud or rough ordering of men, and the men work under their orders as well as I have seen them work anywhere.

A proper division of the duties of the management and the right man in the

right place in each division is essential to success. The machinery department has a handsome Harris Corliss Engine, two Sword's Brick Machines, a Henry Martin Brick Machine and a new Centennial Brick Machine from the Tiffany Iron Works, Tecumseh, Mich. A double cylinder hoisting engine with thirty-six inch drum is used for hauling the clay into the second story of the works.

The limit of the capacity of the works is in the drying floors. There are two steam-heated floors of 4,000 square feet each, that are used for pressed and ornamental brick. There are, also, two fire-heated floors 70 by 150 feet that hold 80,000 brick each, on end. All common brick are set on end, and forty-eight hours are required for drying. They consume fifteen tons of slack and dry 75,000 brick per day. These floors dry very uniformly and are superior to any I have seen in my travels. Their construction is described in Mr. Morrison's book, entitled "Brickmaker's Manual."

The burning is done in five Morrison Kilns, each having a capacity of 350,000. The economy of labor in burning I thought remarkable. Only one man was employed in the process of water smoking, when wood was used for fuel, and two men in the after stages, when coal was used. Their firings were frequent but very light. Vastly different is this from the old-time methods, when all hands were summoned to assist in firing, and the wood was pushed by long rods back into the arches *where it was turned to charcoal*. The bottom course on the kiln floor was, apparently, burned as hard as any, showing that no cold air entered the kiln. I entered a kiln just after it had been emptied, and I do not think there were a thousand brick in the shape of bats remaining.

Bro. Morrison uses what he recommends to others. That his methods are good is attested by the fact that the stock of the Rome Brick Co. is held at 25 per cent. premium. Their trade is very extensive, reaching to almost every State in the South. Sincerely Yours,

GEO. S. TIFFANY.

C. H. & D. R. R., Christmas, 1891.

If our readers will simply write the words "CLAY-WORKER" on the margin of their letters when writing to our advertisers for circulars, etc., they will confer a favor both on us and the advertiser. The latter is anxious to know the source of the inquiry and the words "CLAY-WORKER" will tell the whole story.



OFFICIAL ANNOUNCEMENT

Sixth Annual Meeting of the National
Brick Manufacturers' Association,
to be held at Washington, D. C.,
January 12 to 16, 1892.

To the Members of the N. B. M. A.:

GENTLEMEN—As heretofore announced, our sixth annual convention will be held at Washington, D. C., beginning Tuesday, January 12, 1892, and continuing the balance of the week.

THE CONVENTION HALL.

The meetings will be held in the *Builders' Exchange Hall* located on Thirteenth St., between G and H Streets. Visitors can have their mail addressed to them care Secretary N. B. M. A., Builders' Exchange, Washington, D. C.

HOTEL ACCOMMODATIONS.

The following are the Hotels selected for the accommodations of delegates, who are requested to announce to the clerk on registering that they are members of the N. B. M. A., as a uniform rate of \$3.00 per day will be made to delegates and those accompanying them:

Willard's Hotel, corner 14th and F Streets, North West, may be reached from B. & O. Depot by Street-cars passing both front and back of Hotel, and from Penn. Depot by Street-cars and Herdicks which pass main entrance. Regular rates, \$4.00 and up. Special to those attending Convention \$3.00.

The Riggs House, corner 15th and G Streets, N. W., reached from Penn. Depot by Street-cars which pass main entrance, and by Herdicks. From B. & O. Depot by Street-cars to 14th and G Streets. Regular rate \$4.00 and up. Special rate to delegates \$3.00.

The Ebbitt House, corner 14th and F Streets, N. W. The Metropolitan line of Street-cars from B. & O. Depot passes front entrance. The Penn. Avenue Street-car line and Herdicks from Penn. Depot pass the rear entrance. Regular rate, \$4.00 a day and upwards. Special rate during Convention \$3.00.

The General Headquarters will be Willard's, while those accompanied by

ladies are requested to stop at the Ebbitt House, across the street from Willard's, where special provision will be made for their comfort and entertainment. The proprietors of the Ebbitt House, also, request that those accompanied by ladies advise them in advance of their coming, in order that pleasant apartments may be reserved.

The Hotels are centrally located, convenient to Executive Mansion, War, Navy, State, Treasury, Patent, Pension and Post Office Departments, and the Convention Hall.

EXHIBITION HALL.

Arrangements have been made for an exhibition of brick, models of machinery, kilns, etc., in a large well lighted room, immediately beneath the Convention Hall. Craftsmen are requested to send specimen brick, either green or burned, or both, to Mr. Wm. C. Morrison, Chairman Exhibit Committee, Builders' Exchange Building. The article intended for exhibition should bear the name and address of the manufacturers and should be sent by Express, charges prepaid.

REDUCED RAILROAD RATES

Have been secured on the certificate plan over all lines, composing the Trunk Line Association, The Central Traffic Association, The Southern Passenger Association and the New York and Boston Line Passenger Committee, which include very nearly all the principal railways east of the Mississippi River. Delegates and their friends coming from beyond that line should purchase tickets to first station on east side of river, and then repurchase and secure certificate which will enable them to obtain the reduced rate from the latter point.

Each person desiring the excursion rate must purchase a first-class ticket and pay full fare to Washington, taking a printed certificate from the Ticket Agent, stating that ticket has been purchased at the regular rate. This when countersigned by the Corresponding Secretary will entitle the purchaser to a return ticket at one-third the regular fare, thus making a two-thirds fare for the round trip.

Should any ticket agent fail to have a blank certificate, a certificate or receipt for the amount paid, stating that it for one first-class fare and bearing the agent's stamp should be taken, and will enable the Secretary of the Association to obtain the reduced rate returning, which cannot be done if proper receipt or certificate is not taken.

THE PROGRAMME

of the meetings so far arranged for is as follows:

FIRST SESSION, TUESDAY, 2:30 P. M.

- Roll Call.
- Enrollment of New Members.
- President's Annual Address—
J. C. Adams, Indianapolis Ind.
- Report of Officers.
- Election of Officers.
- Installation of Officers.
- 1. Essay—"Brick and Tile Burning,"
R. M. Greer, Tuxpam, Mex.
- 2. "A Year's Lessons,"
General Discussion Led by Anthony Ittner,
St. Louis, Mo.

Note: At the close of each address or essay, the subject under consideration will be fully discussed.

TUESDAY EVENING, 8:00 O'CLOCK.

Fourth Annual Pow-wow, under the auspices of the Washington Brick Manufacturers' Ass'n. will be held in the Convention Hall. B. H. Warner, Master of Ceremonies.

SECOND SESSION, WEDNESDAY, 9:30 A. M.

- 3. Address—"Use and Abuse of Brickmaking Machinery,"
W. R. Cunningham, Frankfort, Ind.
- 4. Essay—"Mixtures of Clay,"
Robert Lyle, Woodbridge, N. J.
- 5. "Making and Handling Froust & Ornamental Brick,"
Discussion Led by Jas. H. Beggs,
Wilmington, Del.

Reports of Standing Committees.

THIRD SESSION, WEDNESDAY, 2:30 P. M.

- 6. Essay—"Brickmaking, Ancient and Modern,"
Thomas Moulding, Chicago, Ill.
- 7. Address—"Drying Brick,"
Ed. Callaway, Syracuse, N. Y.
- 8. Address—"Organizations of Brickmakers,"
Edwin McGraw, Pittsburgh, Pa.
- 9. "Profit and Loss in Brickmaking,"
Discussion Led by J. B. De Haven, Akron, O.
- 10. Question Box.

FOURTH SESSION, THURSDAY, 9 A. M.

- 11. Essay—"The Soft Clay Process,"
- 12. Address—"The Signs of the Times,"
J. A. Snell, Barrington, R. I.
- 13. Essay—"Paving Brick,"
G. H. Brown, Sioux City, Iowa.
- 14. Address—"Hand Vs. Machine Work,"
Jas. Dingee, Philadelphia, Pa.
- 15. "Does It Pay to Insure Against Casualties?"
Discussion Led by J. C. Adams,
Indianapolis, Ind.
- 16. Question Box.

FIFTH SESSION, THURSDAY, 2:30 P. M.

- 17. Essay—"Burning Brick,"
Wm. H. West, Washington, D. C.
- 18. "Some Essentials to Success in the Use of Oil as a Fuel,"
Discussion Led by ———
- 19. Address—"Labor Troubles—How to Avoid Them,"
D. G. Harriman, New York, N. Y.
- 20. Question Box.

Reports of Committees.
Miscellaneous Business.

FRIDAY.

There will be a free excursion on the splendid iron steamer, "Macalister," to Mt. Vernon, the home and burial place of the immortal Washington. If the weather is propitious this will be a most enjoyable feature. Other side trips, such as a reception at the Executive Mansion and visits to the brickyards are contemplated.

Craftsmen desiring information as to the scope and purpose of the Association, requisites of membership or reports of previous conventions are requested to address the Corresponding Secretary, T. A. Randall, Indianapolis, Ind.

We urgently request all American brickmakers to identify themselves with us in the effort to stimulate progress and aid in the advancement of the entire craft.

Very Respectfully,

THE EXECUTIVE COMMITTEE.

J. C. ADAMS, *President*

T. A. RANDALL, *Cor. Sec'y.*

HOW THE YOUNG SHOULD CONVENE.

Being A Few Pointers on Convention Conventionalities.

BBETTER opportunities to become great, my ambitious young friend, than are offered in conventions are seldom found. The convention is the very four-post hot-bed of fame. The convention of clayworkers needs be no glaring exception.

When you attend the convention, my



SAMPLE BRICK No. 1.

Proper pose when shouting, "Mister Chair-r-r-mun."

youthful delegate, you might just as well start in to be great at once. And, for your purpose, let me give you a few useful recipes:

When some speaker has said something that meets your approval, half way shout out at the top of your voice, "He's a brick from Bricktown Center, Brick County!" This will insure those present knowing you are in attendance.

If anyone is speaking and you think you have something that is spoiling on



SAMPLE BRICK No. 2.

Proper stride for the glare and walk act when your opponent is talking.

your mind, and requires the floor, walk up and down the aisle near the man who has the floor (and who, to your thinking, wants the earth for a dry kiln).

Walk, I say! Walk with your hands in your pockets, and glare at the speaker, and wink at the chairman. The latter may not see you, but others will, and you will instantly be given credit on the books of him who sees you for possessing a clever mind.

Never lose a chance to speak at, to or from the point. Make copious notes. These will be invaluable in settling disputes with the official stenographer, and will give you an outdoor, compressed air of learning.

When you wish to address the chair, do it vociferously. Yell, "Mister-r-r Chair-r-mun! Mister-r-r Chairman!" repeatedly. This commands respect at once. However, don't show any respect for the chair or any other official. Such weakness would reflect on your own personal superiority, and anything of that sort, of course, must never be permitted.

Another good way to become famous



SAMPLE BRICK No. 3.

Proper pose when desiring to express pitying contempt for the man speaking on the other side of the?

is to try to be very witty at the expense of your opponent. If he is addressing the assemblage, make funny pictures of him, and pass them around. A little "poetry" adds zest to the sport. Here, my friend, is a sample of what I have seen:

His nose is red,
A brick is, too;
I'm a daisy,
And so, are you.

Never fail to be heard. Second every motion—even before the motion is properly put. Withdraw your second whenever a chance affords. Make all the amendments and substitutes you get a chance to. Rise to points of order at least twenty times during a meeting,

with a few points of personal privilege thrown in. If the chair rules against you—no matter how trivial the case may be—appeal from the chair's decision. Such a course, if carefully pursued, will



SAMPLE BRICK No. 4.

Proper pose when leaving the hall before adjournment.

make you, my friend, the youthful parliamentarian, an object of remark, and in due time you will receive your reward. Some one will secure for you the appointment to the office of third assistant sergeant-at-arms, whose sole duty it is to guard the extreme outer door—which in cold weather is a most delightful occupation.

When you are assembled in convention, as a final caution, my voiceful friend, keep your gall with you, and keep it hoisted high.

CHARLES LEDERER.

P. S.—Always keep a card about your person when you are in a strange city, giving address and details as to which express to ship your remains by. Great men (at home) when abroad are apt to remain for weeks unidentified. C. L.



SAMPLE BRICK No. 5.

Proper pose when there is an unoccupied chair in front of you—pose indicates spirit of easy indifference.

AUGER MACHINES AND SOME OF THEIR ATTACHMENTS.

NOT many years ago the manufacturers of auger machines were quite well satisfied with the result of their labor in manufacturing, and placing on the market a style of a machine, the principal of which, at this day, stands without a peer.

It is now in general use and we can simply say that a far greater quantity and for all practical purposes a much better quality of brick are being made to-day with the Auger machine than on any other type or style of clayworking machinery.

Having been engaged exclusively since 1856 in the manufacture of clayworking machinery and being also a pioneer in the manufacture of Auger machines; we have given the construction of them and their necessary appurtenances a great deal of thought, and have experimented with a thousand and one different mechanical ideas to satisfy ourselves as to just what was the best to use. We abandoned the idea sometime ago that good brick and tile could be made from the ordinary run of clay, if taken direct from the bank and run through an auger machine—although you may possibly find one or two manufacturers of auger machines, who yet think that the old way is good enough, apparently forgetting that they are living in the Nineteenth Century and that this is an age of progress.

With the auger machine, working the clay direct from the bank, it is pugged and mixed but little. With all auger machines when the clay is fed direct into the hopper, the rear end of the tub is not and cannot be kept full of clay, under pressure, only about two feet of the tub next to the die being full, thus giving you only that amount of pugging capacity, and clay cannot be pugged and mixed to any extent without being confined and under pressure. Again, with all auger machines when run in this way there is constant trouble, the clay turning with the augers, and a back-slip to the clay, all of which is not only bothersome but reduces the capacity of the machine, making the out put more expensive.

To improve the pugging and mixing capacity, thereby greatly improving the out put, as well as increasing the same, we have devised and placed on the market, our improved, Upright Pug Mill, which has given the most flattering results.

Although less than two years since first introduced, it has forced its way to popular favor through sheer merit alone.

This Pug Mill is all that the name implies, it is not an open, horizontal tub with knives, that so many call a pug, which in fact, is not a pug or even much of a mixer, but only a conveyor, nothing more. Our Pug Mill is made entirely of steel and iron, is attached, rigid and strong over the hopper opening in the tub to the auger machine. With this Pug Mill attached we have over seven feet of clay under pressure, instead of two, thereby increasing the pugging and mixing nearly four times over the old way; not only greatly improving the quality of, but entirely doing away with that objectional feature so common to machine made brick—lamination—it mixes and pugs the clay so thoroughly that you get a better mixed, stronger, more compact and durable brick, besides increasing the capacity of your plant, while at the same time you get a strong, steady feed, which of itself does a great deal toward improving the quality of the out put.

Now, just stop a minute and think what our Pug Mill does—gives over seven feet of clay under constant pressure, insuring a steady feed, thorough mixing and pugging and overcoming all turning and back-slip to the clay.

We are the only manufacturers that make this style of Pug Mill—it is our own invention—beware of infringers, because most good things are imitated, and there is no doubt about this being a good thing; two year's use of it by clayworkers, has proven that beyond question. Investigate these facts carefully and we are sure you will agree with us.

You are also aware of the fact that there has been great trouble with side cut brick being crooked and warped when burned. Most all auger machine manufacturers have been for years trying to overcome this most serious obstacle, and have spent a large amount of money experimenting, the result being that only two ways have been discovered to remedy this trouble. One way—the patented process of cutting a brick in a curved direction, forming one side convex, the other concave,—patented by our President, James F. Clark,—is a success. It has been put to the test hundreds of times, by some of the best brickmakers during the last three years, and always under actual tests on different yards and clays has proved to be

right in conception, accurate and true in practical everyday work, and one of the greatest boons to brickmakers. The cutting table we manufacture for side cut brick, which is constructed to cut brick according to the above patent, is not only a marvel of mechanical skill but in its operation it is wonderfully accurate. It is very strong, uses a wire just long enough to pass through the column of clay, thereby reducing the breakage of cut-off wires to a minimum. The shields are movable to and from the column of clay, holding the column steady and protecting the sides while the cut is being made, giving a nice clean cut and square corners to the brick where the wire passes out of the column, thus overcoming the ragged, pulled off edge that you find on brick made with all other styles of side cut cut-off's. The cut is made with one lever, which operates the cut-off mechanism. With each forward or backward movement of the lever a cut of thirteen perfect brick is made. No clippings, no pieces to throw back, no waste; one man can easily work it at a capacity of 75,000 brick per 10 hours, and by working a little harder can cut 100,000 in 10 hours, and the brick are all perfect and when burned they are straight, they are not smeared and mussed up with oil which retards the brick from drying, and oil costs money. We can see no economy in using an automatic cut-off that is expensive to begin with, expensive to keep in repair and running order, and expensive to run, if you have to pay seven cents a gallon for crude oil, as a large number of manufacturers have to do, who are not located near an oil center, and expensive also in its daily operation, as with the best of them, it is necessary to have a very capable mechanic watching over and coaxing them to do better, and above all they are very expensive in this that the work they turn out is not accurate and true, thus reducing the selling quality of, and making the price obtained for a season's out-put so much less, that a manufacturer who figures carefully, will see that he has lost the larger part of the season's profit by using the expensive, complicated and very inaccurate working automatic cut-off, besides having the very poor satisfaction of knowing that his whole season's out put was fit only for fillers and backers.

The other way of overcoming warp and crookedness in making side cut

brick, and the way that all other manufacturers of auger machines are now doing, is by using that very poor device—a lubricating die—and it only makes a fairly straight side-cut brick with one or two kinds of clay. We do not like it, brick manufacturers in general do not like it and would be glad to do away with it if they could only make a straight brick without it, but so many of them have been told, by so many machine men, that this way is the only way to make side-cut brick, that they have settled down to the belief that they cannot do better.

We would like very much to have these gentlemen read this carefully and learn what can be done with a dry die and our patent side-cut, cut-off and do away with that abomination—a lubricating die and its partner, a lubricating cut-off, such an outfit can only make a soft, mussy, sloppy, not compact and a more expensive brick.

The principle most prominent in auger machines is, that of the column of clay as it is being formed, coming in contact with the sides of and passing through the die creates a very strong friction, which, holding the clay back while the auger is forcing it ahead, gives the pressure to the column of clay which so firmly and densely compresses it, that when it is cut into brick, they are better adapted for all purposes where strength, durability, wear and lasting qualities are wanted, than by any other way or method of manufacturing.

Now, this principle, or fact we retain in all our machines, and by using an adjustable dry die which we can adjust to suit any clay or size of column run, we obtain a very strong, uniform pressure, making a very compact and condensed column, which when cut into the proper lengths for brick, tile, fire-proofing, terra cotta lumber, etc., is as near perfect as can be made at this age of the world.

By using a lubricating die what do you accomplish? Virtually nothing, as by its use (we do not care whether you use oil, steam or water as a lubricant), you lose the friction (as explained above), on the column of clay, and there being nothing else to hold the clay back, the auger meets with but little resistance, thus allowing it to force the clay out in a column just strong enough to hold it in shape, but not compressing and packing it together as it should be to make the output—whatever it may be—strong, durable and lasting, besides the very objectional fea-

ture that your column is smeared over with a thin washing of oil and clay or water and clay, according to what you use for a lubricant, making a mussy, nasty output that is all covered with finger marks and otherwise mutilated and never a first-class article.

Another objection to these lubricating dies, as well as lubricating cut-off's, is the fact that if you use oil, you have a coating of oil (which is expensive,) on your green clay product that compels you to waste one or two days extra time in drying for the kiln, as the oil evaporates or is absorbed very slowly, thus greatly increasing the expense, for you must then have a large yard or more shed-room, and, also, increasing the loss from storms by having the output so long in drying.

These ideas and practical every day suggestions are given for the purpose of enabling all present users or intending purchasers of clay-working machinery helping them to carefully judge and consider these points that our long experience has fully convinced us is the true and best way to have the most satisfactory results at the least possible expense.

If any readers of this should want to know more fully about any points in connection with the working of the Auger machine, we will most cheerfully answer any personal letter they may send us and will also advise them as to what Auger machine and its attachments, constructed honestly and on true principles, making perfect work, we consider the best, and where it may be bought at a reasonable price, with our reasons for so doing. Very Truly,

MICH. BRICK AND TILE MACH. CO.
Morenci, Mich.

THE JEFFREY MANUFACTURING CO

The Jeffrey Manufacturing Company, who are known largely throughout the country as manufacturers of malleable and steel roller chains, Mey-Oborn and special chains, have added a line of link belting, made from their own patterns, which will insure uniform pitch. These are made to work on standard sprocket wheels and are interchangeable with other makes of corresponding numbers. This company has the largest line of chains to select from in the world, and it would be to the interest to all users of chains to have their reduced price-list which can be had by addressing the company at Columbus, Chicago or New York.

COME, SEE, KNOW AND BELIEVE FOR YOURSELVES.

We have learned from those who visited us the past summer, that few, if any of your readers, believe what we have said of our kilns, and the rapidity with which we do our burning. To such we say, we have a kiln of tile which was burned in a little less than 48 hours; it is now partly emptied; those remaining in, stand just as when burned.

Come and see us and this kiln of tile; then come again next summer and see us burn and empty a kiln; and if we cannot equal the present kiln in every respect, to a finish, in 48 hours from the time it was placed in our kiln, we will pay all expenses and give you a right to use, what we consider, the best kiln on earth.

You cannot afford to miss this chance, for, if we do as we expect to do, you can much more than recover your time in one summer. If we fail to do as we expect, we pay expenses.

The above proposition presumes the tile to be well dried before putting them in the kiln. For our financial standing see "Bradstreet," or write us for a copy of our local newspaper, from which you can get many names. Write the parties and determine for yourselves whether or not we have a reputation for telling the truth.

Send for circulars.

STEWART BROTHERS,
Mt. Victory, Ohio.

TO THE BRICKMAKERS OF THE U. S.

Our attention has been called to "A Warning" addressed "To the Trade and the Public" by Chisholm, Boyd & White, dated "Chicago, Dec. 24, 1891." The purport of said warning being a threat against any brickmaker who should use the United States Dry Clay Brick Press. This threat is based on Letter's Patent, owned by Chisholm, Boyd & White, the earliest in date being Dec. 24, 1889.

Attention is also called to a suit begun under such patents against the Colorado Fire Clay Manufacturing Co., who are now using one of our machines.

The trade is probably already well aware that we control the pioneer, foundation and underlying patents on brick machines of this character, the latest of which in date is January 8, 1889, so that the latest of our patents is ahead of

the earliest of Messrs. Chisholm, Boyd & White. Our perfected machine has several novel and valuable features of construction which are thoroughly protected by pending applications.

We desire the trade to note particularly that these gentlemen have run away from Chicago where we live and where our machines are manufactured and have brought suit against one of our customers in Colorado, doubtless thinking we should desert our customer rather than to go to the expense of defending him at this distance. In this the gentlemen have reckoned without their host. We have already arranged to vigorously defend against this suit, which we are advised by competent and distinguished patent lawyers is without foundation.

We shall in all cases fully and completely protect our customers in the use of our machines, and the suits now

ready to defend our rights against all comers.

THE SAME FIRM.

On page 527c. of the December CLAY-WORKER we gave under the head "A Malicious Correspondent" the true inwardness of Chisholm, Boyd & White's attempt to injure us by the publication of a false report, as to the use of our machinery by the Colorado Fire Clay Mfg. Co. The sub-joined letter of later date from this firm is interesting, as it tells of their success and thus explains why our competitors resort to such dishonorable methods instead of competing with us fairly on an open market.

Respectfully,

THE UNITED STATES BRICK PRESS CO.,
OSWALD KUTSCHE, PROPRIETOR,

January 4, '91.

Chicago, Ill.

(Copy.)

D. W. COLLINS, J. R. FARRIS, H. H. COVERT,
President. Vice-Pres. & Treas. Secretary,
COLORADO FIRE CLAY MANUFACTURING CO.,
Office Farriss Hotel.

Pueblo, Colo., December 28, 1891,

Mr. Oswald Kutsche, Chicago, Ill.,

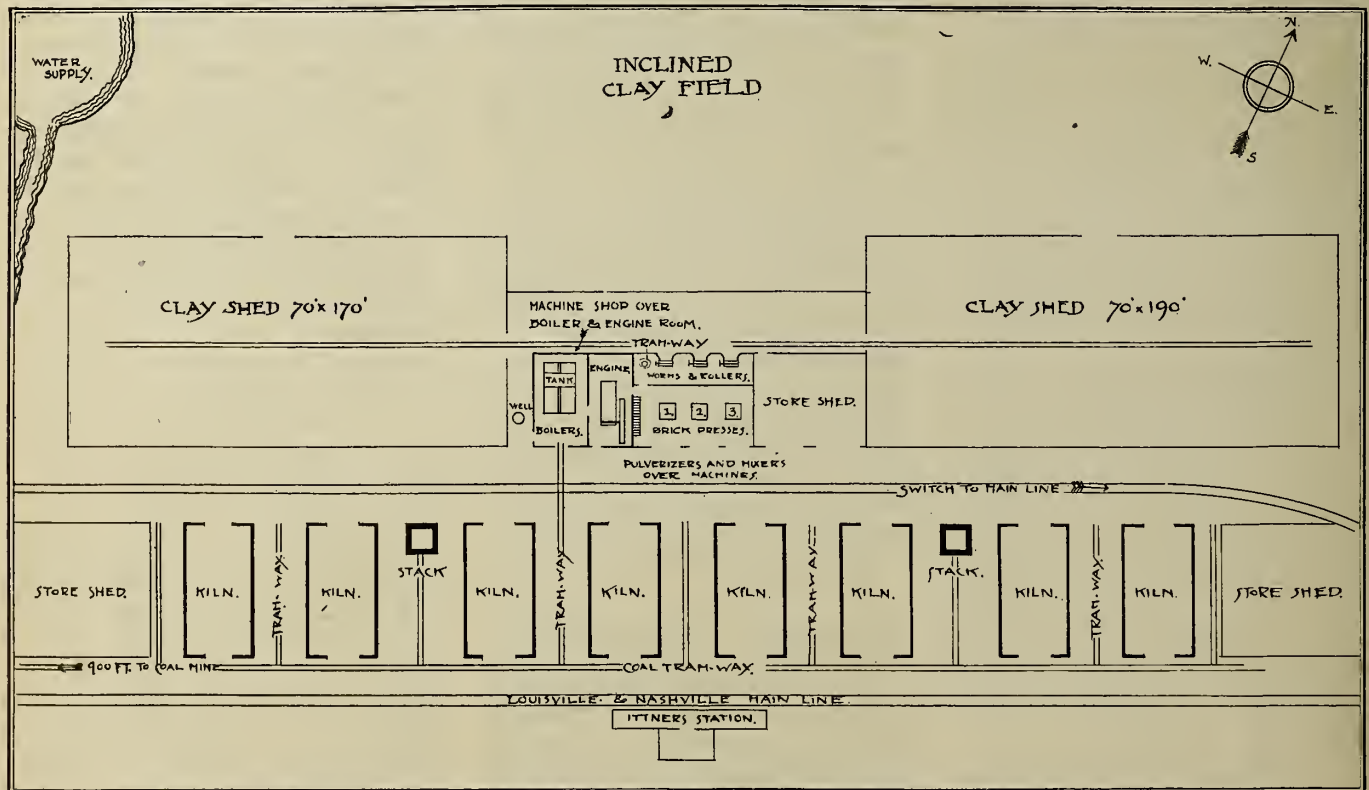
Dear Sir:—I will drop you a few lines in answer

BRICKYARD SKETCHES.

A MODEL BRICK PLANT.

FIFTEEN miles out from St. Louis, on the L. & N. Ry., and one and a quarter miles from Belleville, Ill., is located the new press and ornamental brick factory of Anthony Ittner. We had heard much of this plant and was prepared to see a fine dry press outfit, and was not disappointed.

We visited the works in company with the proprietor, Anthony Ittner, who needs no introduction to our readers. He is well and favorably known to the brickmaking fraternity, having taken an active part in the organization of the N. B. M. A., attending every meeting and doing his full share toward the up-building of the craft, being ever ready both to give and receive council and advice as to better methods of work. There is nothing narrow or illiberal



GROUND PLAN OF ANTHONY ITTNER'S BRICK YARD, BELLEVILLE, ILL.

pending against the Chisholm, Boyd & White machine under four of our patents, all prior in date to theirs, will, we have no doubt, convince these gentlemen that we are in the field to stay, and that they must get out of the business or cease pirating our inventions.

These gentlemen should have been manly and sued us instead of harrassing our customer; but the trade is warned to take no bluff, as we are able and

to your inquiry as to how the U. S. Brick Press is working on our yard.

We finished on the 22nd inst. a kiln of bricks containing 360,000. An average was made per day of 22,000 bricks, without a single stop on account of the machine.

We have made the best kiln of bricks ever made in this country, and I will defy any machine to do better work than ours has done.

I have heard that the Boyd Company has brought suit against our Company for using the U. S. machine. You have got too good a machine not to cause somebody to try to make you trouble.

Hoping to hear from you soon, I am,

(Signed) Yours Truly, T. L. Myers,
317 East 2nd St., Pueblo, Colo.

about Mr. Ittner. He is broad guage and believes there is such a thing as progress in brickmaking as well as in other industrial arts. Some of our readers may infer from this that he is not very old in the business. In this they are mistaken, for he went to work on a yard as an off-bearer when 12 years old, and began making brick for himself by hand in '59. Brickmaking, however, is not the only field in which he has

achieved distinction, but, like many of the representative craftsmen, he has figured prominently in political life, having served two terms in the Missouri State Legislature and was the representative of that State in the 45th Congress. He didn't fancy politics, though, these offices having been forced upon him, and declining a re-election, went back to the brickyard. He has owned large works in St. Louis for several years and still

two-thirds of a yard of clay, which is deposited under immense storage sheds, which, when filled, contain clay enough for an entire season's run. From these sheds the clay is taken in dump cars to a roll crusher, then taken in cup elevator to the second story where it goes through a pulverizer of Mr. Ittner's make, which reduces it to a fine powder and is then sieved and fed to the machine.



ANTHONY ITTNER'S BRICK YARD.

operates them, making about 100 thousand brick a day.

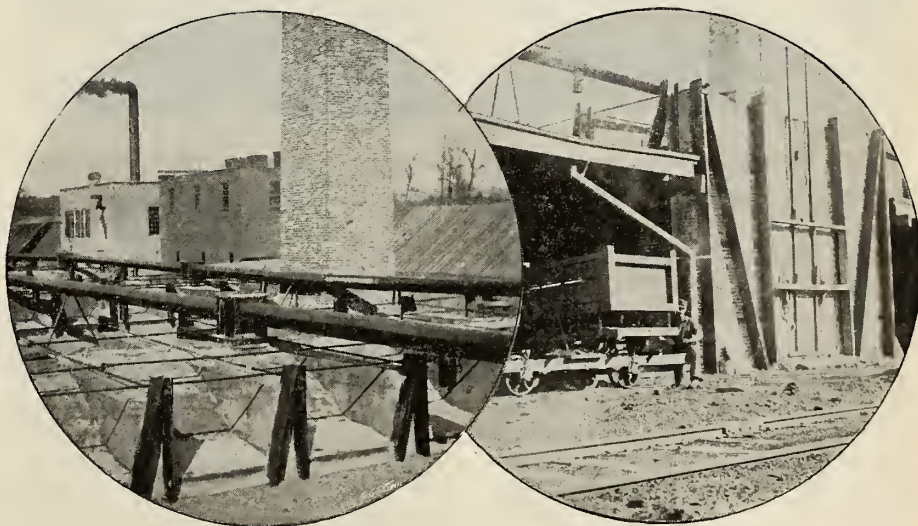
Desiring to make a better grade of front and ornamental brick than he could produce at these works, he purchased a tract of fine clay land, that nature evidently intended for this purpose, embracing 73 acres, and has erected a plant that in very many respects is a model of convenience. The accompanying sketch shows the general plan of the works better than words—while our kodak caught a view of the plant as a whole and one or two views of the kilns. The clay bank extends from the line of the railroad back several hundred feet, sloping upward gradually, the summit being 32 feet above the level of the yard. This gives a clay field 600 feet long and nearly half as wide so situated that the clay can be gathered very easily and quickly. The face of the field is harrowed or plowed two inches or more in depth, and, after it is dried sufficiently, is gathered up in two-wheeled scrapers, similar to the one illustrated on page 527b, December *CLAY-WORKER*. The gatherer is started at the top of the field and filled as it descends, thus making the work comparatively light for the teams. The clay gatherer fills and empties automatically, holding

The Andrus dry press is used exclusively and with gratifying results. From the machines the brick go direct to the kiln. There are eight up and down-

a cooling kiln is conducted to the kiln filled with green brick, which serves the double purpose of drying the brick much better than can be done by the ordinary way of watersmoking, and reduces the fuel bill materially. The latter, with Mr. Ittner, is not a very important matter, for there is a coal shaft only a few hundred feet from the works, from which coal is brought in dump cars at a very small cost. While there has been no wasteful or unnecessary expenditure of capital, there has been no expense spared to make everything about the plant of the best and most durable character possible. The kilns especially are admirably constructed, the walls being very heavy and are braced with 10½ inch channel steel beams and 1¼ inch rods, making the best job of the kind we have seen. The pipes and all iron work is painted black to prevent rust. The top of the kilns are covered with a coat of concrete and the spaces between kilns are covered with gravel roofing. In short everything about the plant is first-class. It is not a brickyard but a brick factory, and there is no wall about it; on the contrary, Mr. Ittner is glad to have brother brickmakers visit and inspect the works throughout. They make nothing but fine red pressed and ornamental brick.

OUT OF THE ASHES.

While journeying through northwestern Ohio, over the Baltimore and



TOP AND END VIEW OF KILNS.

draft kilns of the Alsip patent, holding 170 thousand each, for which there are two stacks 80 feet high; shaft four feet in the clear inside. Extending over these kilns are three 16-inch pipes with which any or all of the kilns may be connected, and, by proper adjustment of the dampers, the escaping heat from

Ohio railroad, about three months ago we stopped off at North Baltimore to inspect the works of the Central Press Brick Co., and to have a chat with their genial superintendent, W. D. Richardson. Judge of our surprise on approaching the place to see nothing but the kilns, a smokestack and boiler, and the irreg-

ular outlines of machinery, partly covered by warped and twisted sheets of corrugated iron roofing. We hurried our footsteps to the spot, where we found our friend directing the removal of the debris, and from him learned of the calamity that had befallen them. Most of us have suffered from the ravages of fire in some manner and can sympathize with these people, who, in one hour, saw their buildings destroyed and their expensive machinery ruined, or badly damaged, and this too, in the midst of a busy season. But they were not long cast down by the disaster. They determined to rebuild better than before. A large force of bricklayers, carpenters and machinists, were set to

pails are near at hand. Thus it is to be seen that this company do not intend to suffer again from fire.

In the large clay sheds we found stored clay enough to run the works six months. From these sheds the clay is shoveled into Penfield's dump cars, in which it is hoisted to the pulverizing room where it is dumped into Emens granulators which act as feeders to the Stedman disintegrators from which the pulverized clay is elevated about 40 feet to the screens. In the press room, in front, are the Simpson presses, making characteristically fine brick, plain and ornamental. The brick are taken direct from the presses to the Eudaly kilns, of which this company have seven, and are

CORRESPONDENCE.

THESE COLUMNS ARE OPEN TO ALL. THE FULL NAME AND ADDRESS IS REQUIRED BUT WILL NOT BE PUBLISHED EXCEPT WHEN PERMISSION IS GIVEN BY CORRESPONDENT. THOSE DESIRING TO COMMUNICATE PRIVATELY WITH ANY CORRESPONDENT WHOSE FULL NAME IS NOT GIVEN CAN DO SO BY ADDRESSING LETTERS CARE OF CLAY-WORKER.

Every Why Hath a Wherefore.

Editor Clay-Worker:

I have read the announcement of the programme for the forthcoming Convention in the December CLAY-WORKER. I am glad that Mr. Harriman is going to give us the paper on "The Labor Question" that we should have had last year. I have not the slightest idea what particular phase of labor he will write on, but I have no doubt it will be interesting and instructive.

In view of the treatment my poor substitute received at Indianapolis, I feel justified in asking the coming Convention to be a little less precipitate in their criticisms on all papers read than they were at that time. It has been rather pleasant to me to have some of the most severe critics of that little document tell me within the past year that my position was an absolutely correct one, but that they still doubted its policy.

The members of the Indianapolis Convention will bear witness to the fact that what I had to say was said on the floor of the Convention, and that I have been content to let time and reflection vindicate or repudiate my theories.

I am not writing this to discuss Mr. Harriman's paper in advance, but to bespeak for him and all others who address the Convention next month fair and courteous treatment. We are not all alike by nature, neither has our education and experience tended to increase our similarity, but our coming together with a common object in view, and with a common desire to promote that object, ought to make us charitable.

I believed last year that the employer of labor in this closing period of the 19th Century, who made a success as such, would do it by treating his employer fairly. I believed that the intelligent employer, who employed only intelligent labor, would never have a recurrence of the disease known as "Labor Troubles." The one idea intended to be prominent in the little paper read at Indianapolis, was that education of both employer and employed would remedy all existing evils and prevent them in the future. The addition of another year's experience



MACHINE HOUSE, CENTRAL PRESS BRICK CO., NORTH BALTIMORE, O., AFTER THE FIRE.

work at once, and, in a short time, there arose from the ashes, Phoenix-like, the most substantial and commodious building for the manufacture of brick to be found on the continent. The buildings are of pressed brick with ornamental trimming. All corners and window and door jambs are of round cornered or beaded brick in red, buff and brown. The machinery building is 120 feet long and 56 feet deep, with three fire walls, separating the boiler room from the engine room, the engine room from the press room and the press room from the grinding room. There is also a brick blacksmith shop and oil room, separated by a fire wall, on the top of which is the water tank. A water line having three hydrants connected with a powerful steam pump extends along the front of the buildings, and a hose cart and fire

burned by natural gas. In front of the kilns, extending along the line of the B. & O. R. R., are the stock sheds—600 feet long. Here we saw a variety of brick of many shapes and colors. Besides the standard shades of red this company make several shades of brown, buff and drab, which they have shipped during the past season from New York to Dakota. They report a good demand for their product at fair prices, and hope ere long, to recover from the loss sustained by fire.

We wish to express our thanks to Mr. Richardson for his courtesy in showing us through the works and in answering all our questions; also for the privilege of pressing the button of our kodak as often as we desired.

WHY is the editor a moral man? Because he always does write.

has made no change in my views save to emphasize them.

To-night closes the books of twenty year's service as a brickmaker. Twenty years from thirty-one to fifty-one is an important part of a man's business life. While there was much in those two decades that I would now wish had been different, yet I can truthfully say that the financial summing up is entirely satisfactory. With good health, an income sufficient for my needs, a happy home, good friends and lots of 'em, what more can a man ask for in this world.

With malice toward none, with charity for all, I wish you and all the readers of the CLAY-WORKER a Happy New Year.

D. V. PURINGTON.

Chicago, Dec. 31, 1891.

Large vs. Small Capacity Machines.

Editor Clay-Worker:

When I wrote the article for the Nov. issue I did not expect to consume any more of your valuable time and space with the subject of "Brick Machinery and Their Daily Capacity," but feel that I must reply to "R. Bricks" and "W. H. Y."

I appreciate "R. Bricks's" letters highly, and consider them in the light of authority or as a guide for others to be governed by, and if he makes any "bad breaks," think it is the duty of the fraternity to debate the question with him.

Friend "Brick," in his October article, advises two machines of thirty thousand capacity each for a sixty thousand capacity plant, instead of one sixty thousand capacity machine, and gives his reasons.

I differed with him and he has me "cutting off automatically more than I can chew." I now ask friend "Brick" why he is hedging in his December article? He says, "There are many things to be taken into consideration before these questions can be properly decided. In some localities large machines are best, in others, smaller machines are preferable." Had you made these explanations in the October article instead of December, my chewing would not have been necessary.

If friend "Brick" is not hedging, he is advising on the principal that misery loves company, as he says in answer to my last question, that if two small machines break down at the same time, he would start his other two, he, having four.

Now candidly friend "Brick" would

you advise me in erecting a sixty thousand and capacity plant, to buy one sixty thousand capacity machine, or four thirty thousand capacity machines, four Pug Mills, all the necessary extra line shafting, belting, pulleys, hangers, etc., and then build extra sheds to shelter the machinery. Now, candidly, would you?

Now friend "W. H. Y.," please go back and read "R. Bricks's" October article, then Tim. Tinker's November, and you will see that you are not altogether in the chew; if you take the above articles fully into consideration, you will notice in the paragraph regarding the successful brickmakers, was in reference to those using two small machines, or one large one to produce the same daily capacity.

In regard to letting my mind run through a Chambers machine, will say that personally I think there are other makes of machines on the market that are equally well adapted to the general wants of the trade as the machine you mention.

Regarding the number of brickmakers in the United States that could make all the brick they could sell in their locality in one month on a fifty or sixty thousand capacity machine, will say I would advise their using a ten or fifteen horse power engine and a ten thousand daily capacity machine and run it for 150 days.

Probably it would be advisable for you to buy a farm, as I know of a number of brickmakers that are not making a "howling success" as brick manufacturers.

TIM TINKER.

The New York Market.

Editor Clay-Worker:

If old Probabilities behaves himself as the sober and sedate personage he is reported to be, our winter has begun before this reaches you, and as a natural result the shipping trade in the brick industry in this section of the country for 1891 will be at an end.

This year will be one long to be remembered by the manufacturers of brick; The hopes that have come to naught, the fears that have been realized as to where the price of brick would "drop" to has made it a "Red Letter" year for the brick trade. As the manufacturer sits by the fire and contemplates the situation, which is not favorable, as the next year is "presidential" year and generally dull, his thoughts are of a depressing nature.

The cause of low prices we know. The effect we can plainly see. Now what are the manufacturers going to do another year. Mr. Bowman "hits the nail on the head" plumb, in his article, in the December number. If the fire-brick trade has fallen from its high estate, what can be expected from poor despised "mud brick" that is turned out in such quantities. The last clause in his valuable paper shows the way to a remedy, but I am afraid the fire-brick-makers are in the same boat with the common brickmakers. They agree to do thus and so—but what does it amount to?

The year 1890 was a very poor one, as far as profits were concerned, in the manufacture of brick. In the spring of this year a meeting was held in the "Astor House," to see if there could not be a combined action on the part of all manufacturers, to so grade their output that the market would not be overstocked—a very simple way, some of your readers say, Y-e-s. The large manufacturers thought, what a snap for us. "Mr. So and so, how many machines have you on your yard?" "Three." "You can run two a day and make your complement?" "Yes." So it run until some of the large producers were asked a question, the reply to which brought to light a very large "Ethiopian." "My yard can make 60 million." "Well, you can make one-third less, can you not?" Here is where the joke comes in. The yard could make that number if every machine should run every day. The yard had never made forty million a year. The large firms shoved up their number of thousands, and the reduction left them just where they had been for many years. The smaller yards saw what was going on, and the thing collapsed. It looks as if the fire-brick trade was in the same state.

The careful skipper consults his barometer to see if the mercury is on the raise, so the brickmaker watches the real estate market to see if there is any movement in unimproved property. I am glad to say that within the past three weeks there has been a movement in real estate. May it continue, so that there will be a very active spring trade, for certainly there has never been so small a stock of brick under the sheds along the Hudson, Hackensack and Raritan rivers at this time a year as there is at present. On six yards here there are 165 arches at the close of 1891; one yard has 170. There is another

peculiarity about this year's market, and that is, the market has not advanced. Every fall after brickmaking stops, there is a marked advance in prices. This year she stands "*statu quo*." Another feature in the trade is that the dealers in New York have not stocked any brick. That is, piled them up for winter use when navigation has closed. Possibly they have some arrangement with "Old Prob." for an open winter.

Last year was a dull one, and I will give you the number of permits for buildings for ten months, from January 1st, 1890, to November of the same year, plans were filed for the erection of 3,151 buildings, to cost \$66,238,959, and for the corresponding period for the year 1891 there was 2,382 buildings to cost \$47,772,474. As will be seen, there were 769 less buildings erected in New York City in ten months of this year than last, all of which effects the brick trade.

There is one blessing. Pork can be bought for \$7.00 per hundred, and buckwheat for \$3.00 per hundred, and if the worst come, buckwheat cakes and pork will keep the wolf from the door.

Tom Reed said that "it was the women that sent the large Democratic majority to Congress, as they had discovered how the 'McKinley' bill had reduced prices on all wearing material." So the wife of one of our brickmakers remarked the other day that, if there was no immediate improvement in the brick business, she was afraid they would be under the necessity of "eating snow-balls" this winter. Her husband, who was present, said: "Suppose there should be no snow." I hope no such conditions may arise that they will have to eat snow-balls, or that there will be no snow.

It would seem as though the "Fates" had something against the brick manufacturers this season. On Friday, Dec. 4th, five barge loads of brick took a drop that was unprecedented in the brick trade. On that date, a tow of eight barges of brick started from Haverstraw, for New York. There was a strong south-east wind blowing, and the river at that point is four miles wide, so it kicks up quite a sea. About six o'clock at night the wind became so heavy that the two boats could not manage the tow. The result was, that five of the barges turned bottom up; their cargoes went to the bottom of the river. Over one million of brick totally lost. The Diamond Co. lost three cargoes, Scott, Bennett & Bowman one, and Henry Christie one. It is the first accident that has befallen the barges since they made their first appearance in the trade. The accident that has just happened was often prophesied, as all the load was carried on deck. As every thing went along smoothly, year after year, the old bugbear of capsizing had disappeared. There were only three lives lost, for a wonder. Think of twenty-five men thrown in the water in the night, a severe storm raging at the time, with no help at hand, except the

tug-boat. The other three boats comprising the tow, were at the mercy of the waves, and did not upset, but were badly damaged by contact with one another.

I give your readers a resume of the closing prices for Hackensack for the last five years: Dec. 23, 1887, \$7.25 per M.; Dec. 14, 1888, \$6.25 per M.; Dec. 16, 1889, \$6.25 per M.; Dec. 28, 1890, \$5.75 per M.; Dec. 22, 1891, \$4.75 per M.

The past two years have been far from making millionaires of our brick manufacturers. What is in store for them next year is unknown. It is to be hoped that a change will speedily take place after the New Year. Last spring prices opened at \$5.50 per M. Manufacturers held back in hopes that there would be an advance. Instead, there was a general falling in prices all along the lines.

The probabilities are, that the first of May will come before there is a start made in the yards.

My New York advise has not a very rosy hue. I will quote them. About 25 barges in market this morning, (Dec. 23). Several of them covered up for the winter. Prices are as follows: Up Rivers, \$4.50 to \$4.87; Haverstraws, \$4.75 to \$5.50, which is the price asked for the very best Haverstraws, and very hard to make sales at that figure. By barges being covered, I mean that boards have been placed over them to keep the rain and snow off the brick, in the hopes that in the winter there will be an advance in price, when the brick will be sold. It looks as if there would be more befogged skippers than the one Capt. Crafts mentioned.

Would "R. Brick" duplicate "cook-stove and candle" for fear they would break down? I think not. In this age of railroads and telegraph, when manufacturers of brick machinery can fill an order at short notice, it looks like a needless outlay to have machines lying idle. In regard to capacity, I do not see where the large machine can do any more work than the small one. Run the small one faster. In adjoining yards here there are machines of the same size and make. One yard runs two a day, or from 5 A. M. to 10 A. M., and turns out 22,000 to a machine in that time. The other yard runs one machine from 5 A. M. to 12 A. M. and turns out 40,000. If the machinery on this yard was in as good order as that on the other yard, they would run the pit out in the same time. I have seen the Adams machine run 23 molds a minute for a whole pit of 30,000. One machine here runs from 12 to 13 per minute.

I was afraid that there would be so much gaseous matter at the Convention that you would all be in danger of suffocation, but happily your last number furnished the "vent" that let off the dangerous matter.

Your advice to the members not to get in bad company is good. Keep your eye on them that they do not visit "Mahogany Hall."

Wishing you and all the brickmaking fraternity a pleasant time and a prosperous and Happy New Year.

A. N. OLDTIMER.

As Others See Us.

Editor Clay-Worker:

Enclosed find order and money for subscription to your paper for one year. The copies of the paper which I have seen indicate very decided ability in the line chosen, and valuable contributions to the literature of the industry represented.

Truly Yours,

THOS. DUNLAP, Pres. S. P. B. Co.,
Triford, Va., Dec. 23, '91

A Use of Bats.

Editor Clay-Worker:

Sometime past I read an inquiry in the CLAY-WORKER from a correspondent asking "What use Broken Brick or Bats could be put to," or words to that effect. After waiting for a long time in hope that some one of your many interesting correspondents would solve the matter, and seeing they have not, I thought it would be no more than fair to offer a suggestion on the subject of what to do with "Broken Brick or Bats."

First, if a mill can be constructed that has the strength and power about it to crush hard brick, and reduce to the consistency of coarse gravel, it seems to the writer that it could be used to a good advantage in making concrete for the foundation of buildings, or for walks or floors in cellars.

Second, when ground till as fine as good building sand, would answer a splendid purpose for cement work in cisterns, and places requiring a strong, lasting cement.

Here in Louisiana we pound and break old refuse fire brick, the best we can, with hammers, until as fine as coarse sand and use it one part broken brick, as above stated, to one part Portland cement, for cementing around sugar kettles, instead, as formerly using all tiles, we find it to be cheaper, and, where the work is properly done, equally as lasting. The heat around sugar kettles is very heavy and intense for weeks at a time. At first it was thought doubtful about the cement standing, but so far it has proved satisfactory.

Now can't some of your progressive mill-men get up a machine for crushing brick to run in connection with the brickyard, and work the bats and refuse brick into shape to be used instead of sand for cement work.

But maybe I have said too much. The brick factories of to-day may have no bats or broken brick in their kilns. If not, so much the better, and we are sorry for what we have said, and hope for pardon in suggesting the thought of crushing brick for use in cementing.

In conclusion, will say that we are ever more and more pleased with the CLAY-WORKER. Mr. J. W. Cray's papers

on bricklaying are splendid and truly instructive; let us hope they will be continued, and that others will write on the same matter. Not alone the brick-makers, but the bricklayers should adopt the CLAY-WORKER as their official journal.

Yours Truly,
Haasville, La.

W.

Gaseous Fuel.

Editor Clay-Worker:

If Mr. Crafts really desires an expression of opinion, when, in his letter in September CLAY-WORKER, he asks: "Does anyone think that unconsumed gases, as he calls them, passing through a mass of white-hot bricks, and so hot when they reach the top of the kiln as sometimes to set the rafters and peaks on fire, fourteen-feet above them, have a cooling effect?" I, for one, unhesitatingly answer yes.

In those eight words, "when they reach the top of the kiln," Mr. Crafts seems to have, all unconsciously, struck the very key-note of the whole question. As gases give out no heat until ignited (consumed), it is, therefore, self-evident that if "unconsumed gases" are so hot "when they reach the top of the kiln," as sometimes to set the rafters and peaks on fire, etc." They must have stolen that heat in "passing through a mass of white-hot bricks," and, consequently, "have a cooling effect," to exactly that extent. In endeavoring to gauge the extent of this "cooling effect" in figures, (given by Mr. Waplington in his last—November—letter, as "nearly $3\frac{1}{2}$ to 1.") The enormous difference in the volume of hydrogen and water, in comparison to the weight, must be borne in mind.

I am certain the entire craft have read with much interest and profit, the controversy on this fascinating subject, which is, undoubtedly, one of the most interesting, as it proves to become one of the most important in the business of brickmaking, and will join with me in returning many thanks to both Bro. Crafts and Bro. Waplington, for their able discussion of the question.

28A

R. M. GREER.

P. S.—Please permit me to take this opportunity of wishing the CLAY-WORKER and its clientele "a prosperous New-Year and many returns."

The New and the Old.

Editor Clay-Worker:

Under the above caption Mr. W. A. Eudaly tells, in the October CLAY-WORKER, of a new order of things, whereby we are to have professional brickmakers, men of affairs rather than the old style, slow-going sort. Maybe so, but to stock a yard complete with full-fledged merchants, doctors, lawyers, bankers, chemists and scientists, and have them succeed, is, I believe, an impossibility, and if one merchant has partially succeeded in the handling of machinery in a brick plant, it is the exception and

not the rule. It is true that some of the old-timers did not take kindly to the new order of things, but that does not go to prove that they were defunct in knowledge, and, whatever success has been attained in the new, was brought about by the knowledge of the old.

And here, I would be pleased to get some information from some one of more experience than I have.

I left off the soft mud process (hand-molding) and commenced the semi-dry with the Penfield machine and the Frey-Sheckler Co. machine. I did not experience any considerable trouble in the change, but I find that the new process does not dry by watersmoking as soon as the hand-molded brick did, and the fire does not rise in the kiln as fast after they are dried out.

If this has been the experience of any of your other patrons, would be pleased to hear from them. I have thought it was because the bricks were made more dense or solid by the machine than by the old hand process.

R. A. DRAWDY.

The Question of Fast Burning.

Editor Clay-Worker:

I have burned thirty brick kilns this year. Eight of them held 550,000 brick each, and they were up-draft kilns, and twenty-two of them were up and down-draft kilns, these holding about 100,000 common brick each. I cannot burn brick quick like some of your readers can; it generally takes me ten days to burn these up and down-draft kilns, three days to dry them off with coke, and seven days to burn them with coal, and those up-draft kilns take me about fourteen days, five days to dry them off with wood and nine days to burn them with coal, and then sometimes they are hardly hard enough; yet we burned very nearly all street blocks here this summer. I cannot burn them by clock or watch like some of your readers can. I generally burn them according to the heat they take. Some clay takes a very hard fire, some don't take near as much. The fire some clays would take to burn a good hard brick would melt others into a solid lump. I would like to hear from some of your readers that can burn brick so quick, whether they have many soft brick or all hard brick. I am burning for Sant & Morris, who have the largest yard around here.

H. H. BROCKRIEDE.
Evansville, Ind.

No More Balky Kilns?

Editor Clay-Worker:

In perusing the columns of the CLAY-WORKER I am pleased that I have found the perfect man; one whose superior knowledge and experience towers above even the possibility of his assistants making a mistake in burning brick, and that balky kilns and cold spots are things of the past, and the stories of old-time brickmakers is told only as proof

of their ignorance. Such is the story of Mr. Marcus E. Jacobs in your September number, but who of all the brick-burners in this broad land having turned his kiln over to his trusted best man with instructions plain to do thus and so, as the case requires, and turned in to get a few hours needed rest, has not been disturbed by a gentle rap at his door with the modest request, "Please, sir, Mr. Blank says come down to the kiln a moment; it is not getting on so well," and when he arrives he finds at a glance that Mr. Blank did as he was told and a great deal extra that he was not told. Balky kilns and cold spots are not myths, but will remain as long as bricks are burned with wood and coal.

P. GREEN.

"Pictures."

Friend Randall:

Please allow me to remark, casually, about the CLAY-WORKER's pictures for December. These pictures are not like the one our mutual friend, "D. V." recently made, below which he modestly wrote, "*This is a Robin.*"

The CLAY-WORKER pictures speak for themselves—some of them audibly and some otherwise. Those that are expected to speak to be heard at the next convention are to be found on pages 509-511-513-515-517 and especially 519 of the December number. I think there is more in the "Committee of fire-escapes," or "The pipe of peace" and "Here lies the hatchet" than we will be able to draw out in one session, except we make better use of the question box than we have done at previous conventions. "The Committee on Fire-escapes" has had very little to report since the N. B. M. A. have so strongly urged fire-proof buildings (which every one knows can only be made from clay). So the "hatchet" is buried, and stone is used for monuments and burned clay for buildings.

There is one monument, however, made from clay, the "picture of which is seen on page 507, and is a representative of a "Fragment of Sculptured Frieze seen in the Pension Building." This is a monument of high art and excellency, and shows what can be attained with patience, labor and a proper mixture of clays. The other speaking pictures first mentioned have had more or less to do since the "Adam" of old—not Jessie, our president. Mark the distinction. The Jessie, though some say old, is not "the Adam of old" meant. This is—a chestnut.

We like your pictures; they look so much like what men ought to be, and, no doubt, what these men are. Let us have more of them. A. NEGATIVE.

W. E. Dawson, Colfax, Ind., is out with a neat pamphlet illustrating and describing his down and up-draft kiln. The circular contains some valuable hints on burning brick and tile and those interested in that important subject will do well to obtain a copy.

Written for the Clay-Worker.

THE FUEL QUESTION.

No. 15.

MOISTURE AND ATMOSPHERIC PRESSURE.

DEAR WILL:—I commence this letter with another attack of the theory of the "rainmakers;" this time in the form of a quotation from the Sunday World, of New York, November 29, 1891. In doing this I do not wish you to infer that it is any proof against such a theory of rainmaking, but to show you that science and intelligence are both against it, and that their own experiments fail to justify any faith whatever in it:

RAINMAKING IN INDIA.

"Madras, Nov. 28.—The theory that explosions in the air will produce rain is beginning to lose its supporters here. Several attempts have been made by exploding dynamite and ruburite at high elevations, but only one was successful, and scoffers say it would have rained anyway. The conditions are particularly favorable here to a demonstration of the truth or falsity of the theory. Even during the dry season heavy clouds pass over the Madras hill, leaving the earth parched and dry, only to discharge their water in the shape of rain two or three miles out at sea. The "rainmakers" tried again to-day only to again meet with failure. Large quantities of dynamite were exploded on the high hills, but the only effect was to make a terrific noise and blow holes in the ground. Not a single drop of rain fell."

I sometimes wonder if Dyrenforth and his followers ever waved their letters back and forth to dry the last few lines of writing, when blotters were not so plentiful, and I wonder how many men who thus wave their letters to dry them realizing that they are raising a brisk wind to do it; this, of course, is the converse of rainmaking, but it is a good copy of the method nature takes in drying up, and the "rainmakers" would succeed better if they would follow nature a little closer.

I need not comment further on this mistaken theory, which has been gaining *opinion* ground for years—notably since the civil war—and has a firm hold in the beliefs of thousands to-day, who know nothing of the natural causes and laws of rainfall, etc.

Proceeding now with our subject. Moisture in the atmosphere very sensibly effects the consumption of fuel in our furnaces, kilns, stoves, etc. It is well

known in blast furnace management that more iron of No. 1 quality can be made in frosty weather than in hot, "muggy" weather, from the same amount, of fuel, and to keep the furnace in good working order during the hot, moist weather additional fuel must be added to each charge to counteract the moisture blown in by the blast. Let us follow this up a little and see the difference in quantity of moisture blown into a modern blast furnace on a hot and on a cold day; say a frosty day at 30° or 32° F., and the hot day, say at 80°. By referring to the table given in my last letter we find that at 80° the atmosphere *may* contain about eleven grains to the cubic foot, and at 32° it may contain 2 grains. Now 20,000 cubic feet of air per minute is no uncommon quantity with the present blast furnaces, and assuming that the air is at 80° and contains ten grains to the cubic foot. By a very simple calculation we find that 28½ pounds of moisture is being blown in per minute, or 1,710 pounds per hour. Now at 32° we find the air saturated with 2 grains per cubic foot; 20,000 cubic feet would therefore contain only ½ of the quantity of moisture or about 5.7 pounds, so that in one hour 342 pounds only would be blown in, being a difference of 1,368 pounds. You will readily perceive that this quantity of moisture will make a corresponding difference in the quantity of fuel required.

Now this moisture has precisely the same bearing on other furnaces, brick kilns, etc., and I will venture to assert that in brickyards equipped for working all the year round that brick burning is effected with less fuel in winter than in summer, notwithstanding the difference in outside temperature being against such an assertion.

By applying the same rule we arrive at the amount of moisture passing through a brick kiln when burning. Assuming the air at the same temperature—80° F.—and of course near the point of saturation, a kiln burning ten tons of coal in twenty-four hours and supplied with about the proper quantity of air for complete combustion would draw in about forty pounds of moisture per hour so long as the air remained at that temperature and point of saturation, while on a frosty morning not more than eight pounds per hour would be drawn in and the resulting brisk fires is the common experience of every observing fireman.

You will by this time perceive that

there is much more involved in the theory of combustion than the supply of oxygen in proper quantity and manner, and that fuel economy embraces a great deal more than the mere *generation* of all the heat contained in the fuel used. Of course it is physically impossible to use up all the heat generated, or anything near it; for the process of combustion is maintained at the cost of a portion of the heat generated thereby, but this is, perhaps, not quite clear enough, so let me state another case: The consumption of heat for the maintenance of draft in generating steam, or that heat which escapes up the flue and chimney. We will assume the temperature of the fire on the grate to be 2500° F., and the burnt gases entering the flue to the chimney to be 500°; here then is evidently a loss of 20 per cent. of the heat generated, taking no account whatever of what is lost by conduction radiation, etc. I trust you now see fully the importance of paying more attention to the *science* of heat, and with this you cannot fail to be struck with the mingling of one branch of science into another, and to observe how very closely related they all are; as I have said before, they are so woven into each other that a comprehensive study of one particular branch entails a general knowledge of all the others. Each has general features of its own, but they merge by degrees into each other like the colors of the solar spectrum as seen through a spectroscope.

HYDRO-CARBON.

(TO BE CONTINUED.)

Similar but Different.

Editor Clay-Worker:

In my concluding letter to S. P. Crafts in the November issue of the CLAY-WORKER your typos make me say, "I wildly protest," and again they make me say, "factiously terms it," whereas I wrote, "I mildly protest," and, "facetiously terms it." I am aware you do not, as a rule, correct these small errors, but the two words, as you have given them, are so entirely opposite in meaning to the terms I used that it reflects on my taste in choosing my terms.

WM. WAPLINGTON.

A High Compliment.

Editor Clay-Worker:

I am in receipt of a copy of the Dec. "CLAY-WORKER." As a trade paper it is a perfect *gem* and a credit to the "Wild West."

It should be read by every clayworker in the United States. The successful manufacturers must keep posted.

Yours Truly,

HENRY GLEASON, Sec'y. National Ass'n.
Fire Brick Mfg'rs.

New York, Dec. 23, '91.

THE CLAY-WORKER.

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T. A. RANDALL & CO.,

81 Massachusetts Ave. Indianapolis.

SEEING IS BELIEVING.

Our readers don't have to look at us much to be convinced that we are in a healthy, robust condition. This number includes 106 pages, being the largest as well as the best clay journal ever printed. We have no complaints to make. None whatever. We are both well and happy, thank you.

OUR FIELD.

A New Year has dawned upon us, and if we may judge from present indications, it is to be a year of remarkable activity in all industrial lines, and, especially, the clayworking industries. 1891 was, as a whole, a prosperous year. The bountiful crops harvested in America and the failure of crops in Europe must tend to increase largely the commercial prosperity of American manufacturers during the coming season.

For ourselves the outlook is most promising. The CLAY-WORKER never entered a year with brighter prospects. Subscriptions are pouring in from all quarters and with them come kindly words of appreciation and good wishes that but adds fuel to the flame of our ambition—that this is true future work and results will prove. Our field is growing and so are our facilities. The CLAY-WORKER's past record will be broken, and a better paper will be published in 1892 than ever before.

To the many new friends and patrons, as well as to those who have stood by

us in the past and aided in the good work by their active support, we return thanks, and wish one and all a prosperous and Happy New Year.

GOOD WORK, WELL DONE.

The work done by Mr. Randall, in the interest of the National Brick Manufacturers' Association, prior to the time when the *Brickmaker* was launched, was of great value, and Mr. Randall did as much to make the Association a success as any other person.—*Brickmaker*.

It is pleasant to be appreciated, and we are glad to know that the above is the general opinion of the craft throughout the county; but we are at a loss to know how the "launching" of our Chicago contemporary has affected our labors in behalf of the Association or anything else. We have kept right along working for the good of the craft in every possible way. First, by furnishing the best trade paper in our line ever published in Europe or America secondly, by furnishing the best means of advertising, the very best article, and, incidentally, as a means of applying what we teach, in laboring to build up the National Association, and we are happy to learn from a variety of sources that in all these departments of work we have not labored in vain. We are not aware of any abatement of zeal or any change of front in any department of our work, dating at or about the time of the *launching* mentioned above. We are making a better paper every year, but our contemporary is in no way responsible for it. We simply have better facilities, a larger field and greater experience. All of which bring us deserved fruits.

THE DEVIL QUOTING SCRIPTURE

One of the easiest things in the world is quoting scripture; besides, it is a sure mark of piety—at least of outside piety. To this end it is one of the favorite tricks of the devil, so common that intelligent men suspect at once that there is something devilish intended whenever they find a man of doubtful veracity beginning a tirade by a quotation from scripture. Of course everybody now understands that when the devil prefaced his remarks to the Saviour by scripture quotations, he intended to be considered very good himself. It is too late in the world now for our juvenile but ambitious little contemporary of Chicago to deceive any one by beginning its tirade against the CLAY-WORKER

by a passage from the decalogue. Of what follows we cannot say, as an old-time preacher said, "It lies like the devil," meaning, as he explained it, lies in the manner of the devil, who is accustomed to tell a little truth for the purpose of sugar-coating a big and mischievous falsehood. The trouble is, there is not enough truth in its whole page of personal abuse to deceive any one.

By the way, we have never known any great success achieved by attempting to build upon the ruins of another. We have no occasion to carp at the ambitious little paper at Chicago. If there is room for it, it will live; if not, it will "writh in pain" a while, then depart. The CLAY-WORKER is very prosperous, thank you, increasing annually in everything that goes to make a useful paper, and all without having to quote scripture in order to mislead its readers.

THE CORNER STONE.

Some one once said that the corner stone of the public is the hearthstone, and then proceeded to read a lecture to mothers about staying at home and seeing that no harm comes by neglect to this corner stone. That is all right enough. Every mother owes much to her hearthstone, which she may not neglect and be guiltless if home loses its attractions. But what has the father to do with this hearthstone? While it must be conceded that the attachment of the father to the home depends largely upon the wife and mother who presides there, it is equally true that the happiness and usefulness of all depend largely upon the husband and father. No perplexities in business or fatigue from work can justify sullenness and crossness in that little circle called home. If the corner-stone of the republic is the hearth-stone the man of the house is as much bound to look after its interests as the woman. It will take the united and harmonious labors of both to make home happy.

THAT BOY

That is a cruel fate which compels a boy to put forth all his strength from the day he can make himself useful in some work that is to produce pecuniary results, to the neglect of his better faculties; yet it is hardly more cruel than the fate which puts a boy to books to the neglect of the essential trainings to a useful life. In many cases this is the

greater wrong. The former may at least become a useful producer, while the latter never produces anything. Brickmakers may have to do with both of these classes. There are many things a boy can do about a brickyard, and there are always boys whose needs compel them to accept any compensation an employer may offer. Some of these, from the necessities of home life, may have had few advantages for mental improvement. A humane employer can not only get from them the manual service contracted for, but he may inspire an ambition to become more than beasts of burden; and it is his duty to do so. Perhaps the boy may indicate no wish to be more than that. This only makes it the more a duty to plant aspirations and to aid in their development.

There may be another boy about the premises. Want does not drive him into the brickyard for the means of support. A well-to-do if not a rich father supplies his needs, and the school, not the yard, is his portion. There is great danger that this boy may be neglected at a more vital point than the other. This is particularly the case if the parents have become suddenly rich. The boy is apt to infer from words and deeds that labor is ignoble, and most of all, he learns to despise the pursuit his father follows. That parent who does not begin at the very beginning to teach his boy to work commits a grievous wrong against the boy. Give him all the education you can, but, above all, teach him how to work.

THE FATE OF A "YALLER" DOG.

Once there was a man who had a "yaller" dog. The dog himself felt very big, but he was really no bigger than common dogs, if as big, but that made no difference; he was a great barker, and when there was nothing near his size to bark at he would squat on his haunches and bark at the moon by the hour; but the moon kept right along, just as if there never was a "yaller" dog. This made the "yaller" dog very mad and he tried to jump to the moon but he fell far short of the moon, and the moon kept right along just the same. At last the "yaller" dog died from sheer barking and jumping, and the man who owned him has never had a "yaller" dog since.

The moral of this story is in its application. Whenever you see a paper whose chief business is barking at bigger and better papers that keep right

along, just think what became of the yaller dog that made barking at the moon his life work. The dog died and no one was sorry, but the moon kept right along.

RAILROAD FARES

The time has fully come to demand a more equitable schedule of railroad fares than has yet been adopted. By combinations the railroads have prevented lower rates on competing lines, and have regulated excursion rates by ironclad and oppressive conditions, so that only large political gatherings can avail themselves of them. Industrial interests are wholly ignored, except under restrictions that are practically prohibitory. There is but one relief possible, and that is to fix the rates for all travelers at the minimum rate for any one. There is no good business reason why a farmer, going to the city to sell his produce, should not have as cheap rates as the city merchant has when he goes to the country to sell his goods. The fact that this one buys a thousand miles, and that one only ten should cut no figure at all. Men attending industrial conventions should have as low rates as politicians have in attending political conventions. In short, the law should fix rates, at least in Indiana, at not over two cents a mile.

THE OHIO ASSOCIATION

The next annual meeting of the Ohio Tile, Brick and Drainage Association will be held at Columbus, February 9 and 10, 1892. The programme, which is nearly completed, will be of unusual interest. A large attendance of the brick and tilemakers of Ohio is desired. Come early, brethren, and stay until the benediction. You cannot afford to miss this opportunity of increasing your knowledge and extending your acquaintance among your fellow craftsmen. Arrangements have been made for reduced rates on all railroads. For programmes and other information, address the secretary, W. D. RICHARDSON, North Baltimore, O.

We have received a specimen Mexican brick from our valued correspondent, R. M. Greer of Tuxpam, Mexico, and will place it on exhibition at the coming Convention in Washington. We hope the members of the N. B. M. A. will see to it that this feature of the annual meeting is not neglected.

UTAH PRESSED BRICK.

The Salt Lake Company's Operations Successful

One of Salt Lake's important new industries, which has developed into a success during the past year, is the manufacture of pressed brick by the Salt Lake Pressed Brick Company. This company is the result of the concentrated energy of the leading firms engaged in manufacturing and building, and they established a first-class plant at the works on the State Road, six miles south of the city. The Boyd Brick Press and attending machinery works in splendid style, and the character of the work turned out is evidenced by the fact that the company's exhibit was awarded a gold medal at the fair, and, in addition, a special premium for the best red front brick. The Shale premium brick is pronounced by all contractors to be equal to the St. Louis hydraulic.

Among recent structures where the Salt Lake pressed brick has been used, are the front of Z. C. M. I. addition, Joseph E. Taylor's, E. Snelgrove's, B. S. Youngster's place and several other places.

The officers and directors of the company are as follows: J. P. Cahoon president; W. J. Tuddenham, vice-president; W. I. Simkins, treasurer; Harry Haynes, secretary; and T. S. Austin, C. J. Brain and George Curley.—*Salt Lake Herald*, December 25.

GOOD READING FOR BRICKMAKERS

NEW ORLEANS, LA., October 9, 1891.

GENTLEMEN:—Replying to your favor of the 29th ult., making inquiry as to the working of our Quaker Brick Machine and Pug Mill, we have to say that our machinery has been running steadily for the past three years, making about 5 000,000 of brick every year. We are entirely pleased with our outfit, and cheerfully recommend same to any one desirous of making bricks by the soft mud process.

Yours Respectfully,

J. A. BLAFFER & SON.

COATESVILLE, IND., October 16, 1891.

GENTLEMEN:—After four years' use of the horsepower, New Quaker Brick Machine, will say that it has given perfect satisfaction. It makes a square brick, costs less per thousand than the old way by hand, and better demand for machine made brick here. Cost for repairs for four years, \$2.50. Machine will work clay that you cannot mold by hand.

Very Respectfully,

HARLAN BROS.

The above are samples of the many testimonial letters we are receiving from our patrons, who are making brick and money with the Quaker. If you want to get in line, write us for further particulars.

FLETCHER & THOMAS.

Indianapolis, Ind.

See our ad. on page 100.

EDITORIAL NOTES and CLIPPINGS.

Mr. Groscup will start a brickyard at Garrett, Ind.

G. E. Moody will establish a brickyard at Morrisville, Vt.

Mt. Pleasant, Tex., is to have a large press brick factory.

Wm. Burke will make pressed brick at Bangor, Me., next season.

W. J. Bickerstaff, Columbus, Ga., wants a flower-pot machine.

An excellent bed of kaolin is said to have been located near Centralia, Wis.

The Garfield Brick Co., Damascus, O., intend putting in a dry press machine.

Bellaire, Ohio, will probably have another paving brick plant next season.

Spearfish, S. D., it thought to be a good point for the location of a brickyard.

Thos. & Jack Foster will both increase the capacity of their brickyards at Du Bois, Pa.

Charleston, Ill., is thought to be a good point for the location of a paving brick plant.

Burnham Bros., Milwaukee, Wis., purchased the Millmont & Grider brickyard near there.

S. N. Collins of the firm of Stewart & Collins, brickmakers, Hastings, Neb., died Dec. 11, '91.

Thos. Nightingale, brick manufacturer, Toronto, Ontario, died Dec. 17, '91.; aged 65.

The St. Louis (Mo.) Press Brick Co. has increased its capital stock from \$25,000, to \$250,000.

Gillick Bros. of Carondolet, St. Louis, Mo., have purchased a Simpson four mold machine.

Jno. F. Durm and others are organizing a company to establish a brick plant at Ocala, Fla.

Miller & Egan will double the capacity of their paving brick works near Nebraska City, Neb.

Fine paving brick clay is found near Alton, Ill., and a large plant will probably be erected there.

Ernest Gleason, Harpersfield, Ohio, is looking for a desirable sight for the location of a brickyard.

The Buncombe Brick & Tile Co. is to add new machinery in the spring to its works at Asheville, N. C.

The Kissel Fire Brick Co., Rochester N. H., burn their brick with peat, obtained near their plant.

S. M. Cofran of Cambridge, Mass., one of the oldest brickmakers in that section, died Dec. 14, '91.

Louis Miller, Arcadia, Mo., wants to purchase a portable soft clay, horse-power brick machine.

The Montello Clay Co., will build large works near Sinking Spring, six miles west of Reading, Pa.

The Weber, La Bahn Brick Co., Chicago, has increased its capital stock from \$100,000 to \$200,000.

Jno. Kloes will enlarge the capacity of his brick plant near Belleville, Ill., by putting in another press.

Jared Valentine Peck, the well known brick manufacturer, Portchester, N. Y., died Christmas morning; aged 76 years.

The Grant Park (Ill.) Brick Co. has been incorporated by Geo. M. Bennett, Geo. N. Clark and others. Capital \$50,000.

The Tower Grove Brick Works of St. Louis, Mo., are increasing their capacity and are putting in a Simpson four mold press.

J. L. Platt of Fort Dodge, Ia., is starting up a dry press yard at Van Meter near Des Moines, Ia., and is putting in Simpson Presses.

The Central Press Brick Company of Cleveland, O., are increasing their capacity and putting in another four mold Simpson Press.

A boiler in Wallace's brick works at Irondale, O., exploded Dec. 19, killing Oscar Campbell, 14 years old, and demolishing the works.

The Preston Brick Tile, & Terra Cotta Co., is putting in new machinery, and otherwise improving their brick plant at Hornersville, N. Y.

The Edgar Pressed Brick Co. has been organized at Wausau, Wis. Capital \$10,000. Walter Alexander, G. F. Bellis and others are interested.

Wm. Wisner, Wooster, O., is trying to organize a company to make paving brick there. There are immense beds of shale in that vicinity.

We are indebted to the McLagon Foundry Co., New Haven, Conn., and to the Decatur Leader Mfg. Co., Decatur, Ill., for handsome calendars for 1892.

The New Britain (Conn.) Architectural Terra Cotta Co., has been organized by Philip Corbin, G. B. Post, G. S. Barkentin and others. Capital stock \$25,000.

Camp & Thompson's sewer pipe plant at Greentown, O., built at a cost of \$30,000, was burned to the ground Christmas. The fire originated in the engine room. Insurance, \$12,000.

The Denver (Colo.) Paving and Press Brick Co. has been incorporated. Capital \$100,000. The directors are C. W. Larmon, F. N. Davis, H. A. Skinner, C. H. Coy and J. C. Lawson.

Parry Bros., Cambridge, Mass., who were the first to run a winter yard in New England, are now experimenting with oil and will likely burn all of their brick hereafter with that fuel.

H. Brockschmitt of St. Louis, Mo., is starting up a dry press yard and has bought through D. B. Drummond a Simpson four mold machine and William's Cyclone Pulverizer.

The J. D. Moran Mfg. & Construction Co., St. Paul, Minn., has been incorporated with a capital stock of \$600,000. Jno. D. Moran is president and treasurer and Patrick J. Ryan vice-president and secretary.

A company has been organized to establish brick and pottery works at New Castle, Colo. The officers are Perry Coryell, Pres.; S. M. Thompson, Manager; Max Shayer Secy. and J. W. Ross, Treas.

Lacon, Ala., is the new post-office address of the Standard Brick & Tile Works. The station was formerly called Cedar Crossing. G. P. Orendorff is the proprietor and manager of the brick works.

Fletcher & Thomas report sales of complete heavy steam-power outfit of brick machinery to parties in Aikin, S. C., also in western parts of this State. They are expecting to make shipments soon to three points in South America.

A new clay disintegrator is illustrated on page 58. The inventor, Mr. R. N. Ross, has had a very wide experience in manipulating clays of all kinds and knows what is needed in this character of work.

The "Monarch," a new stiff clay machine made by the Wellington Machine Co., is illustrated on pages 84 and 85 of this issue. Those who have been using it the past season commend the "Monarch" very highly.

The Crescent pottery in Trenton N. J., one of the largest sanitary ware potteries in the United States, was almost totally destroyed by fire Christmas. It is thought the fire was of incendiary origin. The loss is estimated at \$100,000.; covered by insurance.

The Simpson Brick Press Co., of Chicago, Ill., is supplying the Central Pressed Brick Co., of North Baltimore, Ohio, with another four mold machine. This is the third consecutive order they have given for the Simpson four mold press.

On page 86 we introduce to the trade a new firm and a new brick machine. Messrs. Fate & Gunsallus, however, have both had an extensive experience in clayworking machinery, and will doubtless make the "Plymouth" a very familiar name to the craft.

Many manufacturers are now arranging for various improvements in their works for the coming season. The putting in of new machinery of large capacity will leave them with small machines and appliances that are to all intents and purposes as good as new, which may be easily disposed of by a small "ad." in our "For Sale, Wanted, Etc.," column.

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TO THE CLAYWORKING TRADE.

Having enjoyed an extensive and satisfactory trade during the entire year, 1891, being crowded to our fullest capacity all the while, we are so much encouraged by the appreciation of our efforts by the trade that we now have ready for 1892 a special line of high grade machinery, second to none, with any desired capacity from 25 to 75 thousand bricks per day, and feel that we can make it to your advantage to write to us before placing your orders. We kindly ask all who attend the N. B. M. A. at Washington, D. C., to look up our representative while there. He will be pleased to see you, and may be able to give you a pointer.

We wish to extend to the trade our hearty thanks for their liberal patronage and trust they will favor us with a continuance, which we will ever endeavor to fully merit and trust the trade will each year WONDER more. Wishing you all a happy and prosperous '92, we remain, Very truly yours,

The Wallace Mfg. Co.,
FRANKFORT, IND.

See Ad. on Page 101.

THE CLAYWORKER.

THE OFFICIAL ORGAN OF THE NATIONAL BRICK MANUFACTURERS' ASSOCIATION OF THE UNITED STATES OF AMERICA.

VOL. XVII.

INDIANAPOLIS, IND., FEBRUARY, 1892.

No. 2

Written for the Clay-Worker.

EXAMPLES OF AMERICAN BRICK AND TERRA COTTA WORK.

No. 42.

THE BARNUM INSTITUTE OF SCIENCE AND HISTORY, BRIDGEPORT, CONN.

This building, a prospective of which is shown on the following page, was a gift of P. T. Barnum to the Scientific and Historical Societies of the city, which was so long his home.

The materials of which the building is constructed are red sand stone laid up in rock-faced work for the first story. Above the first story the ornamental belts, the clustered columns with their capitals and bases, the ornamental

the dawning light of civilization, about the period of 1760. The third and central panel shows Bridgeport in the year 1810, when schooners were sent on their coasting expeditions from this port and when whaling vessels could often be seen in the harbor. The fourth panel indicates Bridgeport during the year 1861. Volunteers have answered the call to arms and Bridgeport's quota of brave boys are assembled ready to march to the seat of action. The fifth and last panel shows the city in 1870 beginning her career of prosperous manufacturing industries.

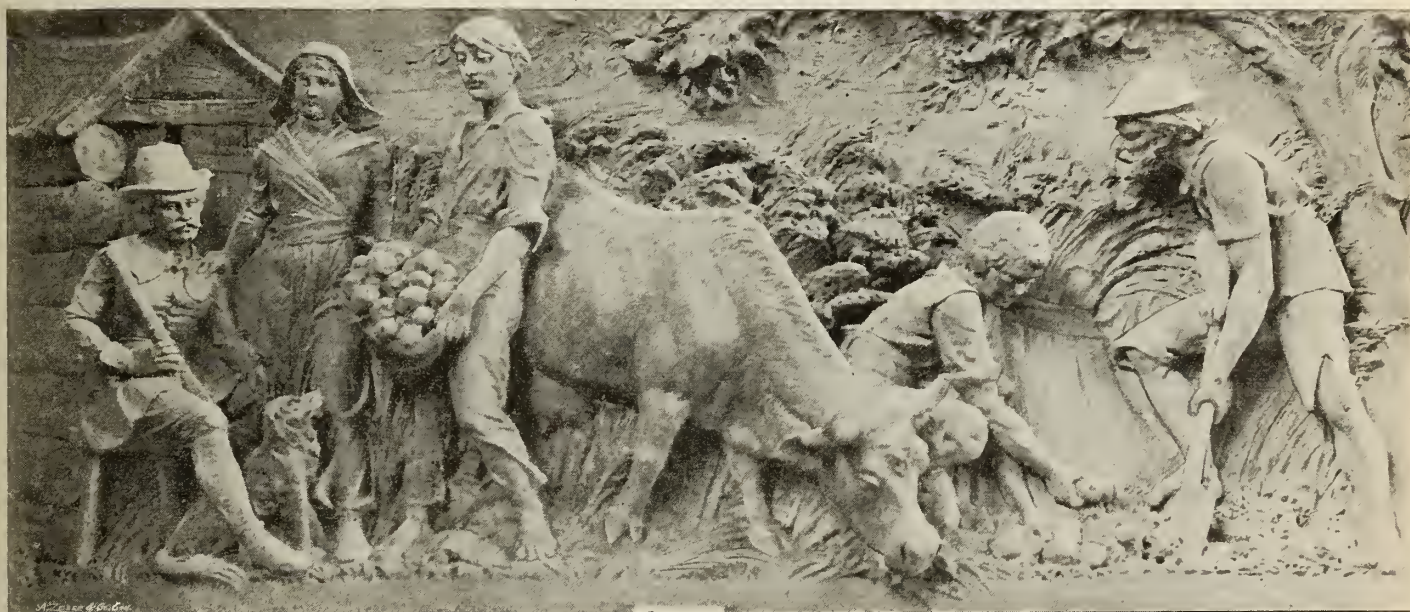
The medallions between the panels are ideal heads of the various periods

apex of the dome will be of copper gilded with gold leaf and will be 6 feet from tip to tip of wings. The round tower in the back ground is to be used as an observatory.

The cost of the building is about \$100,000. The architects are Messrs. Longstaff & Hurd, of Bridgeport, Conn.

MAKING VAGABONDS.

We have all been pained at finding young men twenty years or more of age, among the idlers and vagabonds of the community, whose parents we knew as well-to-do mechanics or laboring men. Why is this? In some cases it is owing to the folly of parents in not putting



FRAGMENT OF TERRA COTTA FRIEZE, BARNUM INSTITUTE OF SCIENCE AND HISTORY, BRIDGEPORT, CONN.—EXECUTED BY THE BOSTON TERRA COTTA CO.

frieze, the quoins and arches are all composed of dark red terra cotta molded from special designs of the architects. The historical frieze contains figures about one-half life size and has been divided into five panels. The first, with its group of Indians in the foreground represents Bridgeport during the year 1690. The next which we illustrate shows the early settlers reclaiming the virgin soil, hunters returning from the forest, farmers plowing the field, and

mentioned. This frieze is modeled in bold relief easily distinguishable from the street and is the work of the Boston Terra Cotta Co., of Boston, who have the entire contract for exterior and interior terra cotta for this notable building.

The slanting portions of the roof, the covering of the great dome and of the great tower will be in red unglazed tile. The upper portion of the dome, also the upper portion of the tower, will be covered with copper. The eagle at the

their sons to work, wishing them to have an easier time in life than they themselves have had; but in nine cases out of ten it is because these young men, when boys, were driven from shops in which they had sought employment, because there was no room for boys. This system of arbitrarily limiting the number of apprentices to a shop or factory is not over a third of a century old, in this country, yet it is old enough to have produced an army of vagabonds,

many of whom are children of the very men who enacted and enforced the law, while not in a single case has it afforded more than a limited and temporary advantage to those who hoped to be profited by it. Let boys work. If any one is turned away from any employment for want of room let it be the man whose enforced idleness will not degenerate into vagrancy. Many a father lives to reap the bitter fruits of his policy a quarter of a century ago, while the widows of many are drinking the bitterest of cups as the consequences of that policy that drives boys out to become vagabonds.

Written for the Clay-Worker.

HINTS ON BRICKMAKING.

No. 60.

BY. R. BRICK.

AFTER the kind of machine has been determined upon, then select the one that best suits your purpose. Perhaps, if two or more are equally good, you may get more favorable prices or terms from one than from another. If soft mud machine is selected, would get not less than twenty horse-power engine. Where the expense can be met it is best in buying power to get enough for two machines, if you think of ever increasing your output beyond what one machine will turn out. If a stiff mud machine is selected would get at least thirty horse-power—this for machines making from twenty-five thousand to thirty-five thousand per day. As to the kind of stiff mud machine depends upon the nature of your clay. If the clay is tenacious and unctuous, it will work on a die machine, either auger or plunger. The former seem to be superseding the latter recently. If your clay is of a sandy nature or short grained, then the mold wheel machine, such as the Sword and Brewer-Sword stiff mud machine, is preferable. These machines make bricks in a mold, and have a positive delivery of a fixed number of bricks to each revolution of the wheel. Making bricks in a mold is the only true principle for a machine, although these machines as now made do not make a brick as smooth on the surface as the die machine, but for laying common walls and for all purposes except face bricks they are not excelled by any other machine. If a soft mud machine is used get a pugger to prepare the clay. If a stiff clay machine is used, use a roll crusher and elevator to pre-

pare the clay and carry it to the machine. The machines and engine should be located nearest the clay deposit. The kilns should be built with one end within ten feet of a railroad track, the other end toward machines, with one hundred feet space between the kiln and machines for drying yard. If the product is to be shipped by rail there should be a track at each end of the kilns. The track next the drying yard should be on a six-foot trestle, so that the bricks going into the kilns pass under the track and coal for kilns and dryer can be dumped from this trestle. It is not expected that all this can be done at the beginning, but it is necessary to have a definite plan in view at the beginning, so there will be no need of making any changes as the plant is growing to completion.

It is proper here to consider the best time to begin the new plant. The plant should be located and machinery and power ordered in January or February, so as to have them on the ground early in March. The lumber for buildings, also, should be on hand early, drains opened and yard graded with a fall of one foot in one hundred feet. Everything necessary for a start should be ready for making brick, just as soon as danger from freezing has passed. In the South the first of April would be a safe and proper time; farther north May first would be the proper time. For the first season it will be necessary to dry the brick by sun and air. If soft mud bricks are to be dried, then hacking pallets, as a temporary way, is best. The pallets are placed in rows across the drying yard, end to end and one pallet above the other, about eight pallets in height. To dry rapidly the hacks should be eight feet apart; this gives room for trucks and wheelbarrows to turn and pass each other. There should be planks or blocks for the bottom pallets to rest on to prevent them from settling out of level, which would cause the hacks to fall. A cover can be made for these hacks by nailing the edges of two 12-inch wide boards or planks, one inch thick, together, forming two sides of a square, then three pieces four by ten inches across on the inside from one to the other. This braces them and keeps them in shape, and these pieces rest on bricks and keeps the planks from resting on the ends of the bricks. Beginning at the lowest end of the hack to cover, let one end of the second cover lap on the first cover and repeat this

until the entire hack is covered. Then with a broad plank set on the ground and leaned against each side of the hack, they are well protected against an ordinary rain. Stiff mud bricks can be hacked on pallets in like manner; the end pieces must be five inches deep to allow the bricks to set on edge; or they can be hacked without pallets one upon the other. As this outside drying is to be only a temporary thing, there should be just as little spent on it as possible, except where the material can be utilized in building the permanent artificial dryer later.

A good substantial engine and machine house should be at least twenty feet nearer the clay bank than the machines, and to one side of the center of the building. Where one or more machines are placed in line parallel with the row of kilns, the line shaft should be in the second story; then belt down to the machines. This gets it out of the way of the trestles of the clay car track and everything else. The engine and boiler being at one side, allows the incline hoist track to come into the center of the plant. The machine house should be at least eighteen feet high to the eaves of the roof. This allows the clay to come in above the machines on the cars and the clay to dump on a level with crushers, the car being at least eight feet above the crusher. This leaves room for several car loads of clay between crusher and track. In case the cars are delayed they have a reserve of clay to keep the machine moving. This trestle incline track and hoist need not be put in at the start; just arrange for this ultimately. At the start if the clay be near it can be brought to the crusher in wheelbarrows; if not near enough for that, horses and carts can be used, but the machine house should be built full height at the start.

Before the buildings are erected we should decide the kind of dryer that is to be finally put in. There are tunnel dryers of various kinds, all built on substantially the same principles, but different modes of generating and applying the heat. One plan is to heat the tunnel by flues passing under, the heat radiating through a tight covering from flues to tunnel; another where the heat and flame enters the tunnel from the flues; another where the heat radiates from steam pipes laid on the floor of the tunnel, the bricks being placed on cars and run on the tracks into and through the tunnels. This plan saves

something in labor, but there is a question about the saving of fuel over the old flue or hot floor dryer. The trouble with the latter dryer is, they are rarely ever properly built, hence are condemned without a fair trial. In the next article the merits of the flue dryer and proper construction of the same will be discussed, and the proper way to proceed with the temporary yard, with a view of building the hot floor as a permanent dryer.

Written for the Clay-Worker.

HEAT AND DRAFT IN BRICK KILNS, DRYING BRICK IN DRY- ERS OR KILNS.

BY J. W. CRARY, SR.

IN January '92, CLAY-WORKER, D. W. Stookey has an able and interesting article on "Chimneys and Drafts."

He truly says that "good draft does not depend on a high chimney, but on one built to be a non-conductor of heat, and so that it will not crack and let in cold air." Then again he says "that all brick or clay wares should

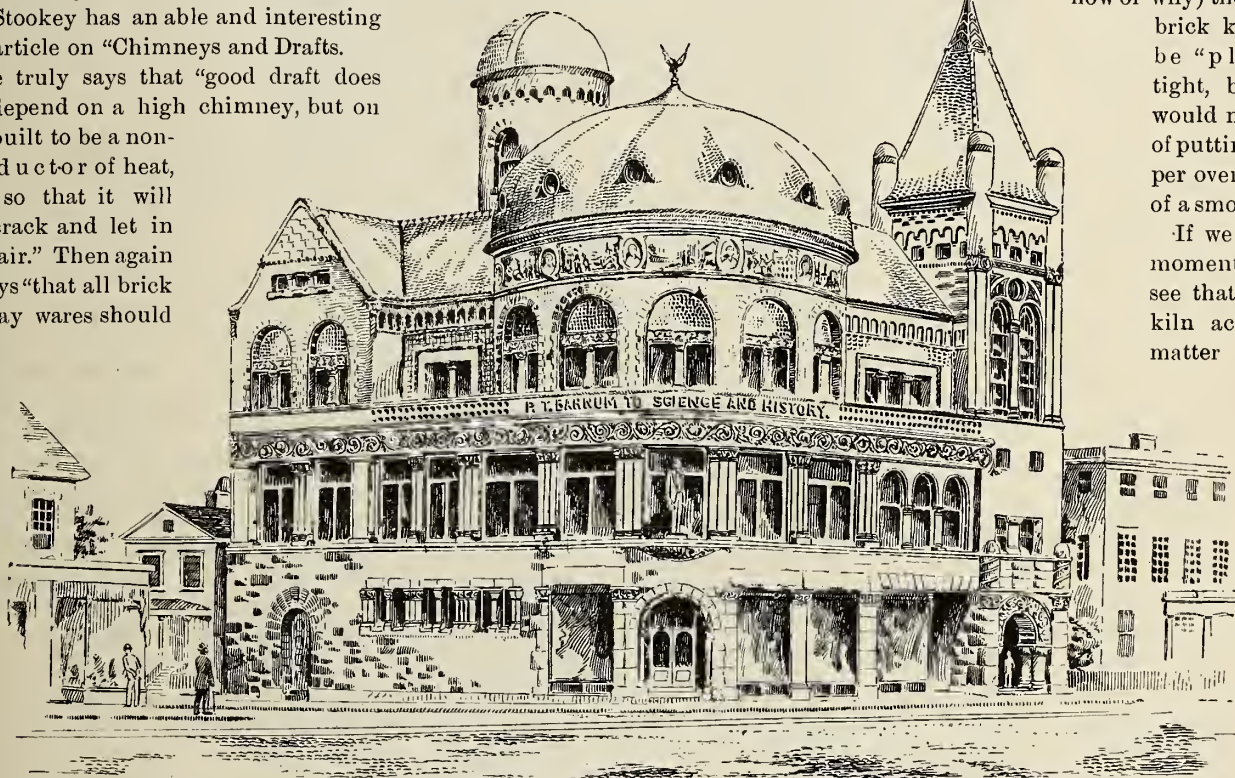
the area of the flue from $2\frac{1}{2}$ feet, to $3\frac{1}{2}$ feet square. I took the responsibility for a good draft, and built the chimney as I proposed. In order to prevent sparks or fire-coals from going out at top of chimney, to endanger the buildings, or lumber, I had an up and down draft flue, ten feet high, built with the chimney, so that before the smoke started to ascend the chimney all the heavy sparks were deposited at the bottom of the chimney. The Civil Engineer predicted a failure of my plans, both as to the chimneys and furnace for the boilers. I reduced the grate surface one sixth, and left $2\frac{1}{2}$ feet of air chamber under the boilers, both of which was condemned by the Civil Engineer in charge.

dampers in the horizontal flue had to be kept often two-thirds closed. Green, wet saw-dust was burned with rapid combustion. I will state that the walls of the chimneys were built hollow, the flue was set off $2\frac{1}{2}$ inches from the outside walls, no cracks ever appeared on the outside, the job was a complete success.

The same laws for draft in brick kilns, as for boiler furnaces. If a common smoke flue, or stack were divided

into many small flues it would act very much, in drawing smoke and gases, like a brick kiln. There are those who think that some how or other (they can't tell how or why) the top of a brick kiln must be "platted" tight, but they would not think of putting a damper over the top of a smoke stack.

If we reflect a moment we will see that a brick kiln acts in a matter of draft



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be set in a kiln so that a free, clear draft will be had from bottom to top of kiln."

These, with other facts in regard to draft, are well stated by Mr. Stookey.

The only reliable theories are proved theories. I will state an experiment of my own, which I based on Mr. Stookey's theory which proves his theory.

In 1860 a company started a large lumber business on the Perdido river, near Pensacola. I undertook to make and lay the brick for the plant. The Civil Engineer in charge, wanted a chimney for draft from boiler furnace, to be built 100 feet high. I proposed to build it 64 feet high, and increase

When ready to get up steam, I took charge of the furnace. There was a horizontal smoke flue, 50 feet long, from boiler furnace to chimney, and it was said that I could never get a draft to the chimney, because of the long, horizontal flue.

Before putting fire on the grates I went to the ash door of the chimney, and started a fire, which I kept up about two hours. When the chimney became quite warm, then I closed the "ash doors" and started fire in boiler furnace. In less than five minutes a good draft was established, and within 48 hours the draft was so strong that the

very much like a return flue, boiler furnace. The furnace of arches in a brick kiln is built out four or five feet from the kiln, the principal heat is generated in the furnace, and is forced back into the arch by the pressure of cold air from the outside, and then up through the open spaces between the brick to top of kiln. The kiln acting both as boiler and smoke stack.

The draft of a brick kiln, depends on the "setting." If a "brick-setter" sets his brick close, and irregular, it is impossible to have a good draft, or efficient combustion of fuel. In such kilns, the water smoking is so retarded that the steam is con-

densed on the cold brick above the fire, and if the fire be kept up with the increasing draft in the furnace, a "water settle" is certain, so that the only safe and practical rule for setting brick, is to be sure that the open space between brick is large and free enough to allow the hot air and steam, to readily escape, up through, and out of the kiln.

There is a due proportion of size of furnace door and open space of setting, in kiln. The open spaces between brick in an arch of a kiln, should be about three-quarters of an inch. If we allow one-third of these spaces to be obstructed by brick, necessarily crossing each other, we have in the arch of an ordinary kiln, about 4,000 square inches, each arch has two furnaces, the average or common size of the doors is equal to about 200 to 400 square inches. Now it is seen that the cold air entering the doors of furnaces of one arch, is 400 square inches, about one-tenth the area of the open spaces in the arch; but the air and gases heated require at least ten times more space for their exit up through the kiln. An excess of space, or a want of space between brick for draft, are alike injurious.

I have found by actual and repeated experiment, that a brick kiln set zigzag, or as I term it, "skintling," three-fourths of an inch apart, from bottom to top, 40 to 45 brick high, gives the best draft, and retains and distributes heat better than any other way that I have ever tried. With proper firing the combustion of fuel is nearly perfect in this kiln, and if it be covered, with damp fire clay as it burns off, as I direct in my book, a uniform perfect burn is the certain result.

Can brick be dried in a kiln set for burning, as cheap as in a dryer? This question has been much discussed, and I have been requested to say something on the subject. To begin with, I will state that I have no interest in any patent dryer, nor have I examined any of them, with a view to give a decided opinion as to their particular, or special merits.

I look upon it as a question of necessity, not one of economy. If brick are to be made during the winter season, then some good dryer is an indispensable necessity, but if brick are to be made only through the spring, summer and fall seasons, then dryers are not a matter of economy. It takes as much heat to make a green or wet brick dry in a dryer, as it does to dry it in a kiln set for burning, and unless brick from a dryer be burned very soon after set in a kiln, they

will absorb water from the air so as to become quite damp. To illustrate, take brick from a dry press machine, and run them through a dryer, then set them in a kiln for burning, and within a week or ten days, the kiln will be as damp, and will water smoke as much, as if the brick had been set directly from the machine. I speak from personal observation as well as theory.

Clay abhors perfect dryness, the same as "nature abhors a vacuum." Theoretically there can be no such thing as dry clay, for when clay is heated to the point of dryness, its plasticity is gone in a moment, and it ceases to be clay, and its tenacity, or plastic nature can never be restored—a phenomenon, which science has not been able to explain. I have set one arch, (being six courses wide) in a kiln all of brick as dry as sun and air could make them, the next arch I set of brick as wet as they could be and stand without crushing. I found that the water smoke from the wet brick lasted about twelve hours longer than from the dry brick, but the fire was up on top of the arch that was set up-wet, as soon as on the arch that was set of dry brick.

Now this looks at first sight, to be false reasoning, but cause and effect go hand in hand, and practical results as the true test of theory. But if we consider the theory of my statement as above we will see its truth. Water, is many times a better conductor of heat than clay, and therefore, heat will penetrate and ascend up through damp brick, as quickly and with greater intensity, than up through dry brick, and if the "water smoke" can readily pass up and out of the top of a kiln, without obstruction, there is no very considerable gain, in setting brick "bone dry" from a dryer, or hot sun.

It may be asked, if wet brick will burn as well as dry brick, why go to any trouble or expense to dry brick, more than is needed to prevent their crushing when set in kiln? I answer, that if brick can be burned as fast as dried, there would be a gain of time in burning, but as I have said, if "bone-dry" brick be left standing in a kiln, over a week they will absorb a certain maximum amount of water from the air, so that to set brick from a dryer and utilize the cost of drying, kilns should be set up, and fired within a week. This may be done, but, as yet, I think its importance has been overlooked.

DRY PRESS BRICK NEED NO DRYERS.

If clay be in the right condition for dry press brick, the brick should be set

directly from the machine into the kiln, even during the coldest weather, this can be done, provided, the clay be frozen, when it goes into the machine. It would not do, to make a brick of dry clay, not frozen, and then let it freeze, but if the brick be pressed with frost in it, the frost will dry out without harm to the brick.

As to my opinion of dryers, the best are those that carry a heat of about 100° F. with a strong current of air out, through the brick. This condition of air and heat properly applied to wet or soft brick will produce the best effect. Dryers that heat soft brick rapidly are to be avoided or used with great caution. Clay, more than any other mineral, is a "strict constructionist," of its laws of action, and one of its laws, is to *go slow*. I think that one-half of all clay goods, are injured by fast work in drying, burning and cooling.

THE FIRE BRICK INDUSTRY OF NEW ENGLAND.

Mr. President, and Gentlemen of the National Association of Fire Brick Manufacturers:

To give a little insight into the Fire Brick industry of New England, to show its ups and downs for the past ten years, and *especially* its latter tendency, may not in itself be a particularly hard task; but to suggest a *remedy* for an existing malady is *not* always so easy, and I confess that my ability in this direction does not extend far enough to solve the puzzling problem. I shall, therefore, after having put it into a light (that I trust will be brilliant enough to be perceptible), ask my co-workers in clay to come to my aid, so that if there is any way out of existing difficulties it may be found, knowing that as "many hands make light work," so may many minds elucidate more clearly points which to one oft-times seem dull and incomprehensible.

New England to-day, to my way of thinking, has not the same footing in the manufacture of fire brick that it had ten years ago. To say there were not the same number made and sold would undoubtedly be putting a wrong construction upon facts, and falsifying that which, by actual tabulation of figures taken from the kiln and sale books of our different corporations and firms engaged in the business, would show that many more were now produced,

Paper read by William Homes, firm Fiske, Coleman & Co., Boston, Mass., at the annual meeting, December 2 and 3, 1891, in New York.

compared to the period I speak of. Many more are made than in former years; therefore, why is not New England to-day in a better situation than formerly? To make more bricks certainly requires the service of more men, consumes more clay or raw material, and more coal is used in manufacturing. All this is true. We pay out more money for these things; we make more business for the laborer, the clay miner and coal seller; but yet, no, in as flourishing condition as in 1881.

Where our loss comes partially and makes particular note upon our sales account is in the loss of what we term the higher grades of our product; that for which in former times we obtained prices that showed a profit, beyond the possibilities of the cheaper goods manufactured at the same time, from cheaper material. Every maker knows the latitude in this direction; that the difference in cost is not proportionate with the increase of price obtained; and to cut off a branch of business that in the long run gives you so much to "go and come" upon, as did the difference in grades of bricks then furnished must of itself tell seriously upon the final accounting of yearly profits. Why are we not making the high grades as formerly? Why this decline in a portion of our product so remunerative? It is surely not because we can not produce goods sufficiently refractory for all required wants, as our methods and processes are certainly up to the standard of superior excellence; we have clays fully equal to those we formerly used, while skill in manipulation has surely not degenerated. None of these are reasons for the decline, but it can be traced directly to the decline of a business that did take nearly all we produced.

The Iron industry of New England is fast becoming a thing of the past. Mills that, ten years ago, had every wheel in

motion, that ran night and day in keeping pace with their many orders, to-day are quiet, with machinery idle, and fast going to decay, from which there is little chance of ever receiving a portion of its value over and above the old iron price.

It is sad, even laying our own feature in the matter aside, to see this once noble industry leaving our shores, a dying wake the only evidence of its past magnificence, and, as far as many of our

ing 60 per cent. of its former bulk. This shows that the State of Massachusetts has suffered the most, and as it undoubtedly had most of the iron mills of New England, certainly we who manufacture in Massachusetts have suffered as much as any this decline of an industry that depended so largely upon us for the fire brick supply. I would like to show in detail the status of the fire brick business as far as each State is concerned, but the difficulty of obtaining statistics totally precludes the possibility of doing so.

In order to make this paper of any value, it is necessary to go into some such showing, and all I can do in this direction is to give assumed calculations of the bulk of business done, and from the books of my own firm make some calculations and furnish some averages that, although showing the workings of one concern alone, will undoubtedly give a fair representation or proportion of the condition of the business in general.

I had hoped that the production of each concern might be compiled, so that, although not necessary to give the production of each individual concern here, an aggregate might be shown, but in answering inquiries some gave it and others omitted it, therefore nothing definite can be said.

To return to the question of grades furnished as effecting our profits. This once flourishing and now crippled iron industry requires a highly refractory

grade of fire brick, and as each iron rolling concern dropped out of existence, so also dropped a large amount of orders for bricks to the manufacturer who was supplying that particular mill. Not only was this a total loss of the higher grades, but was a total loss of the trade for bricks, good, bad or indifferent; a crippling feature, had not our market improved in other directions.

This has been the case, but now comes the other point of loss, in the fact, that



WM. HOMES, OF FISKE, COLEMAN & CO., BOSTON, MASS.

prominent mills are concerned, a lasting impression, the only thing remaining.

In 1880 the amount of iron and steel rolled in Massachusetts, as shown by Swank's statistics, was 114,250 tons, and in 1887 has declined to 45,853 tons, a depreciation of 60 per cent., and leaving only 40 per cent. of its former bulk. All New England produced, in 1880, 170,877 tons, and in 1887, 102,711 tons, a depreciation of 40 per cent., only leav-

although our grade did increase in other directions, yet such the nature of that increase as to warrant only the production of goods created by that demand, which were of a much cheaper class. The factories, foundries, mills, etc., of New England still remain, but the general demand is for the cheapest grades for boiler setting, and price one can obtain is influenced every time by the price our customer can purchase for.

Our New Jersey brothers crowd us hard, and some offer their goods in our market at ridiculously low prices. I have known bricks to be put into New England, and near its farthest corner, for about \$20 per thousand, and I am informed by one manufacturer that he knows it to be a fact that they have been sold as low as \$18.50 per thousand. Brother manufacturer of New England, can you see a living profit in that price? Do you care to keep your factories running and meet these figures? I think not! But, gentlemen, that is what we are asked to respond to. Fortunately we can sell some bricks, and do at better prices, and most of our New Jersey neighbors do not crowd us so hard; but the prices of nine-inch fire bricks are altogether too low, and even at better prices leaves but little margin in our business. We in New England feel that we are more oppressed in a general business way than others, for the reason that, in the matter of grades, our neighbors in Pennsylvania and New Jersey yet have a good demand for the higher grades, as the iron business is one of the principal industries in their vicinity; although we know their competition is severe and prices low in proportion. Why they have the iron business and we have not, it is not the purpose of this paper to demonstrate; it is a political question, upon which there are many views, but we know we have it not, and suffer in consequence; that the Jersey and Pennsylvania brick man offers his goods to what do remain, while we cannot reciprocate by offering goods in their market.

One redeeming feature in our business is the matter of tiles, shapes and blocks. Stove linings are a large feature in most of the clay factories of New England, but as we are not engaged in this particular branch, I must leave that to our friend Perkins, of Stamford, Conn., who, I believe, is chairman of that committee, and has made it a point to post himself on the inner workings of that portion. I am given to understand,

however, that through the appointment of that committee by the National Association of Fire Brick Manufacturers results have crowned their efforts of such a nature as to warrant the hope of brighter prospects in the near future, if not now already in force. Heretofore it has, like bricks, been a very close business. In tiles, shapes and blocks we hold the strength of yearly income, inasmuch that without it we would, indeed, be in a sorry condition to continue what would prove a losing game. Even in these the depreciation has been great in price obtained, although in quantity we make more than ever. This is a branch in which the iron trade never played in New England so important a part, but competition has lowered the profits very materially, and many more goods of this description are now furnished for the same amount of money than in 1881. Let us now look at the condition of the fire brick and tile business as it has existed between the years 1881 and 1891; comparison being made, as I say, from our own books.

In 1881 I find the average price of fire brick sold to have been \$44 per thousand, while tiles, shapes and blocks averaged on a thousand brick price, was \$70.10. The average of both was \$49.73.

1882.
Average price of Brick was \$43.25 per M.
" " of Tiles, etc. 99.03 " M.
" " of Both 55.08 " M.

1883.
Average price of Brick was \$42.74 per M.
" " of Tiles, etc. 87.46 " M.
" " of Both 53.81 " M.

1884.
Average price of Brick was \$40.14 per M.
" " of Tiles, etc. 97.78 " M.
" " of Both 51.49 " M.

1885.
Average price of Brick was \$40.02 per M.
" " of Tiles, etc. 100.25 " M.
" " of Both 51.49 " M.

1886.
Average price of Brick was \$33.61 per M.
" " of Tiles, etc. 81.28 " M.
" " of Both 43.78 " M.

1887.
Average price of Brick was \$32.80 per M.
" " of Tiles, etc. 70.45 " M.
" " of Both 41.58 " M.

1888.
Average price of Brick was \$32.72 per M.
" " of Tiles, etc. 73.15 " M.
" " of Both 40.79 " M.

1889.
Average price of Brick was \$32.57 per M.
" " of Tiles, etc. 53.09 " M.
" " of Both 38.93 " M.

1890.

Average price of Brick was \$32.28 per M
" " of Tiles, etc. 61.76 " M
" " of Both 41.24 " M

In making this average to tiles, shapes and blocks, I assumed each block of tile to be equal to $4\frac{1}{2}$ bricks, a proportion from which we do not find much variation in our practice and yearly computation.

In averaging our sales for the past ten years, and basing the year 1881 as 100 per cent., I find them to have varied in intervening time as follows, viz.:

	On Tiles, Shapes and Blocks.	On Brick.
1881.	100 Per cent.	100 Per cent.
1882.	129 " "	135 " "
1883.	119 " "	102 " "
1884.	86 " "	99 " "
1885.	80 " "	79 " "
1886.	160 " "	166 " "
1887.	227 " "	212 " "
1888.	202 " "	228 " "
1889.	300 " "	188 " "
1890.	279 " "	180 " "

Here we show an increase in 1882, but beginning that year we show a decrease in business for the years 1883, 1884, until we reach a low era in 1885. Suddenly in 1886 we find our sales doubling what they were in 1885 on shapes and tiles, and more than doubling our sales of fire bricks. Again we increase in 1887, fall off a little in tiles and shapes in 1888, although we increase in amount of brick sold. 1889 finds us way in advance on tiles and shapes, but with a considerable decrease in sales of brick. 1890 was not as good as 1889, and I do not think 1891 will more than equal 1890, if as much.

You must, of course, understand that in reading this paper I am treating entirely with fire bricks, tiles and shapes, and the averages I give are in no way effected by other branches of our business, my object simply being to show the general state of that branch that interests our members of the National Association of Fire Brick Manufacturers. Into this should, I suppose, come the item of barrelled material, which also forms an important part. Basing the year 1881 as 100 per cent., I find each represented as follows, viz.:

	100 Per cent.
1881.	100 Per cent.
1882.	126 " "
1883.	120 " "
1884.	102 " "
1885.	93 " "
1886.	133 " "
1887.	154 " "
1888.	149 " "
1889.	150 " "
1890.	151 " "

These averages apply to sales, and the average price for ten years has been about \$2 per barrel, which makes us reasonably satisfied on this score. The average of tiles, shapes and blocks for ten years has been \$73.46; average of brick, \$36.05; and average of both, \$45.08 all based as prices per thousand bricks. These averages made by dividing total value of dollars by total number of bricks sold.

Taken as an average, this would undoubtedly be satisfactory, but as I show the average price of bricks has been steadily declining since 1881, while tiles and shapes date their declination since 1885. The question is, where will it end, or whether, with our increased business, we have developed methods for cheapening the cost? We have to a certain extent, but I fear our inventive genius is not equal to the emergency and cannot keep pace with the downward tendency here exhibited.

Do foreign fire bricks enter into the question at all? Well, I should say they did. We were formerly quite large importers of foreign goods, but can now say that, aside from a demand that is imperative—that is, a customer who insists on having a foreign brick and no other—we now import none, and the last year have turned away customers, when we could not induce them to take our goods in preference. Let me show you our foreign brick business for the past ten years:

In 1881 we sold	451,708 Bricks.
1882 " "	314,132 "
1883 " "	248,917 "
1884 " "	55,100 "
1885 " "	118,654 "
1886 " "	37,243 "
1887 " "	25,549 "
1888 " "	24,244 "
1889 " "	20,617 "
1890 " "	11,100 "

We consider that this record will show that we are fast going out of the foreign brick business, and our sales in 1890 certainly had little or no effect on the market.

We have strong McKinley tendencies and only wish the entire importation could be stopped, that our manufacturers might receive the benefits of what now certainly works to their detriment. Well, are we succeeding in driving this monster from our shores? In listening to the proceedings of last year's meeting, a point was made that, through the efforts of our worthy secretary, the matter had been so adjusted in the McKinley tariff bill that fire brick

manufacturers would now, undoubtedly, be relieved from the oppression before existing.

Gentlemen, I am a tariff man. I believe in protecting home industry. I believe in doing anything for the general good of my countrymen, and especially do I believe in doing that which will benefit the fire brick manufacturers. We could not at that time determine what the result of the bill would be, but figures are what tell, and let us now see what they are.

I give below a schedule of the importations of foreign fire brick into the United States since 1883, and would give it before that time, making my ten years complete, were it not that previously to the year 1884 earthenware and fire brick were lumped together, precluding the division to show what we desire. I cannot tell you what came into the port of Boston, Mass., which would, undoubtedly, be more in keeping with the paper I am reading, viz.: "The Fire Brick Industry of New England," excepting the year 1890 and a portion of 1891, because the Government books are sent to Washington, and I had no means of access to them. I think it matters little, however, as we all are interested, and want to know what effects our general business.

Listen:

	IMPORTATION.	VALUE.
In 1884.	7,222,906 Bricks.	\$103,309.
1885.	3,401,549 "	35,616.
1886.	3,463,002 "	43,371.
1887.	4,684,428 "	53,684.
1888.	6,794,557 "	78,709.
1889.	6,439,852 "	68,612.
1890.*	8,698,614 "	84,185.

*The year the McKinley Bill went in force.

Total importation, 40,704,908; brick value, \$467,486. Bath and fire brick together imported the year 1882 were valued at \$69,575, and 1883, \$124,948. What now, gentlemen? Is it a success, or have we not tried it long enough? Probably not. If I remember rightly, the McKinley Bill went into force in October, 1890, but certainly 2,258,762 more foreign fire brick came into the United States in 1890 than in 1889, if the figures given me are correct.

Were I an orator, trying to demonstrate the Free Trade side of this question, probably here is where I would stop. I would show you the figures and leave the apparent solution to yourselves, but although we are compelled to look at this additional importation, and that, squarely in the face, we may

yet be able to see reasons for the large increase over and above the former year, and not charge it all to any defect in the working of the McKinley Bill. As figures, they show to you that, during the year 1890, 2,258,762 more bricks came into the United States than in 1889, and a point could certainly be made to the uninitiated, who do not understand the working of the United States custom department, and leave an impression that this was what came in during the calendar year of 1890. This, however, is not so, as the Government's yearly reports date to June 30, inclusively; consequently the figures I give you as those of 1890 really represent what came in after June 30, 1889, and previously to July 1, 1890, and are not in any way effected by the McKinley Bill (which went in force the following October), except as I shall herewith show, viz.:

Last year developed in my own city a demand for bricks for building purposes, and the foreign brick, although properly fire bricks and invoiced as such, entered largely into the construction of fronts; consequently, where before 1,500 to 2,000 of these might be sold to a mill owner or agent for setting his boiler, a single individual might purchase 50,000 for a building, and it would need but a few of such buildings to consume the difference of 2,258,000 bricks imported into the entire United States. Another very feasible reason is, that many importers were anticipating the advance of duties and valuation, and laid in an additional stock.

Now, let us compare the valuation for the years 1889 and 1890, and we shall find that in 1889 the average foreign valuation was \$10.65 per thousand, while the average valuation in 1890 was only \$9.68 per thousand. Why was this? Why did the Englishman put his price down? Because he wished to induce importers to lay in a stock, knowing that he must take still less when the bill went in force. This the Englishman does not like to do any more than ourselves. Here is a difference of 97 cents per thousand, and I am sure he contains some of our American feeling, and would rather take 97 cents more than 97 cents less. I cannot show you the figures for the entire United States since July 1, 1890, for the reason that the year of 1891, although completed on June 30, last, sufficient time has not elapsed to print the report, and is therefore not in available shape. I am sorry not to be able to do so, because what I

have shown you does not really tell how the bill has effected us, only as I explained. In order to make up the discrepancy, I will now return to the basis or subject of my paper, and will give you some figures as effecting New England, which will at least give a relative basis for solving the working of the McKinley Bill. I herewith append statement of fire brick entered for consumption into the port of Boston for the calendar year of 1890 and 1891 by quarters, ending September 30, of the latter year, with quantities, value and duties thereon:

Classes.	Quarter ending	Rate of Duty.	Quantity.	Value.	Duty.
Fire Brick.	1890, March 31.	20 Per cent.	No. 54,455	\$ 490 00	\$ 98 00
do.	1890, June 30.	20 Per cent.	" 190,297	1821 00	364 20
do.	1890, Sept. 30.	20 Per cent.	" 271,390	2395 00	479 00
	1890, Dec. 31.	{ \$1 25 Per Ton.	{ 130,083 390 1-10 tons.	{ 1957 00	{ 487 63
Fire Brick.	1891, March 31.	{ \$1 25 Per Ton.	{ 186,667 560 Tons.	{ 2578 00	{ 700 00
Not Glazed, Ornamented or Decorated in any manner.	1891, June 30.	{ \$1 25 Per Ton.	{ 269,934 809 8-10 tons.	{ 3603 00	{ 1012 25
	1891, Sept. 30.	{ \$1 25 Per Ton.	{ 279,550 838 13-20 tons.	{ 3170 00	{ 1048 31

Now let us analyze this a little!

On March 31st, '90, 54,455 bricks had been imported into Boston, at a valuation (foreign) of \$490 or \$8.99 per M. From March 31st to July 1st 190,297 bricks had come in, valued at \$1,821 or \$9.59 per M. Between June 30th and October 1st, 1890, 271,390 bricks came in valued at \$2,395.00 or \$8.82 per M. Here is when the McKinley Bill went into operation, and we find that Dec. 31st, 1890, only showed an importation of 130,083 bricks valued at \$1,957, or \$15.05 per M.

Why is this? My argument that under the McKinley regime the Englishman's valuation would be less is not holding good. But wait! I shall try and answer! The decline in number imported, is evidently the check caused by the first working of the Bill, the importers have put in a stock and are awaiting results, and possibly the time of year may have something to do with it. It is only temporary, however, as the Englishman is not going to give up his trade if he can possibly remain. But why this increase of value? That was to be expected, for whereas, previous to this time, we paid duties on a valuation at the works, the new bill levied taxes

on the goods at Liverpool, or other shipping points, and freights, cartages, etc., were all added and show in our customs valuation. Did this go on? Figures bear me out in answering, "No, it did not" The bricks cost too much on this side, and next quarter, or March 31, 1891, we find that the Englishman has reduced his value to \$2,578 on 186,667 bricks, or, in place of receiving \$15.05 as in former quarter, he now seems willing to accept \$13.81 per M. Good! We have then started downward, and let us see what came next? Why! in quarter

ending June 30, 1891, we find that 269,934 bricks came in, with a valuation of \$3,603 and instead of receiving \$13.81 per M., as in previous quarter, he is now willing to "knock off" 47c more per M., and take \$13.34. Still the importer says to his correspondent, "We cannot pay you that, even, you must come down, or the American manufacturer will get the best of it!" The response comes nobly! and next quarter Mr. Englishman furnishes 279,550 bricks for \$3,170, or \$11.34 per M. Of course he sells a few more bricks, for he is getting down somewhere near his old valuation, which means that he is paying these freights, cartages, etc., to Liverpool from his own pocket. Does he like it? Will he keep it up? Time alone, gentlemen, will tell, but we have it started in the right direction! Does the importer sell his bricks on this side of the water for less money? No! for he has to pay \$3.75 per M. duty now, whereas \$1.79, \$1.91 and \$1.76, were the thousand price duties, for the nine previous months, by quarters, and he cannot afford to. More bricks do come in, as the foreign valuation lowers, but the tendency of foreign valuation, as I say, is downward, and they will go down, too, and, I hope, so low, that it will tire them

out. If we can hold prices of English goods where they are for a while, figures show that it worries the importer, as he has each quarter to ask his correspondent to take less, in order that he may see a profit. Is this helping the manufacturers here? Gentlemen, I think it is, most decidedly, as English or foreign fire bricks are full as high as formerly, and the result of reduced prices abroad, is to put cheaper goods upon our market, which must tell against them, and, to our benefit, in the end. My figures for number of bricks, now that fire bricks are dutiable by ton, are based on three tons per M., which is the customary shipping weight. My query, "Do foreign fire brick enter into the question?" and my own answer, "that they did," is correct in this respect, that they do gentlemen, to too large an extent, but I think the right legislation exists, and hope that which we do not expect to cure in a moment, will, in the end, succumb to our exertions so well begun.

I said I would give an approximate idea of the total manufacture of New England, and, as nearly as I can estimate, we now have nine factories making fire bricks, tiles and shapes in New England, whose annual output cannot be far from 5,000,000 to 5,500,000.

In my average of \$32.28 per M. for bricks in 1890, what few higher grades we do sell, go to help out this figure, but I feel, and know, that the larger part of our product, goes for a much smaller price. We need the assistance of the National Association to adjust matters. There is no reason why with proper thought, and each other's aid, better prices cannot be obtained. It would not make a particle of difference, in the total output, as record shows, that customers think more of your goods, but just as many, and are better satisfied, on good, fair payments to you, than when you are cutting each other's throats, spoiling your profits, and creating bad feeling, all as a pure matter of what is termed "Greed!"

As the world moves, and as surely as the sailing vessel replaced the galley, as the swift locomotive took the place of the post horse and stage coach, as the trained lightning displaced the courier, so will coal, cumbrous, costly and grimy, give place to some more perfect, more ethereal essence, evolving from itself, distilled from its liquid essence, or it may be to that kindred invisible agent that springs forth spontaneously and perfect at the touch of the drill.

Written for the Clay-Worker.

BRICK ROADWAYS IN EUROPE.

HOLLAND is the land of brick architecture. The natural building materials are clay products. All the stone that has been or is being used has been brought into this part of the country before the days of railroads, which period has occupied the very large proportion of all time connected with this country, stone was not to be thought of excepting at large expense. The result is that all of the old architecture and that which is really the best is of brick. It is particularly instructive to see brick architecture as it has been developed naturally, where bricks have been used in the way best suited to their natural forms. This could best come about when the people were without the resources of a railway and constructive literature. We are able to see just what these people will do when entirely untrammelled by precedent.

These people are even without a natural rock to make lime. A few days ago I went to the sea coast and saw men distributed along the beach for miles, scraping up shells in the surf of the incoming tide during a cold December day. These shells are the lime producing material of this section. The men have carts and wheel-barrows in the edge of the surf, while they wade along parallel to the incoming tide, dragging a net on the ground. It requires patience, some skill and necessarily some suffering during the cold months. It is well to bear in mind, as enforcing the idea that Holland is a clay country, that stone is not to be thought of as a natural product; that most of the soil has been reclaimed from the sea; that the whole country is below the sea level, and that the soil itself has mostly been made from the decayed vegetable matter of recent epochs.

Brick pavements for streets have had their greatest tests in this section. I have been rather impatient to get here and investigate results in a field where there could be no question about facts. Brick pavements have been used for country roads and for city boulevards for many years, and as far as the brick themselves are concerned, the result has been eminently satisfactory. The pave-

ments have lasted well; they are not so noisy and slippery as asphalt and certainly not nearly so expensive. It is true, however, that the brick have not been laid on a first-class foundation—Cement is not a cheap article in this country. The foundation has been upon made ground and without the use of cement. Every thing has been done that could be to make a solid, unyielding foundation with sand from the beach and other natural material though without the use of cement. The result is that more of the streets or roads are not perfectly smooth. However, they are much better than we are used to seeing



ED. H. CALLAWAY, BRICK MANUFACTURER, SYRACUSE, N. Y.

at home, though not absolutely perfect in respect to their surface. At times we see where the surface has suffered from the travel over its unevenness. However, even this does not have the effect one would expect. Any one who stops to think about it can understand that a naturally rough, uneven pavement will show wear from heavy teaming, which would have no effect if the pavement were smooth. It is easy to understand that there is a heavy jarring and pounding on an uneven roadway which is not felt on one which is smooth. The jarring and pounding is felt by the individual who rides in the vehicle. It must be understood that it is much greater on the roadbed itself where

there is not the intervention of springs and other counter acting devices. Driving over a rough roadway amounts to pounding the depressions with the full weight and momentum of the vehicle. However, I am able to say despite all this that their brick roadways are better than either their stone or wooden blocks in all respects, in that they are not so slippery, so noisy or uncomfortable for the travel of horses. In only one respect do asphalt streets of Amsterdam and Rotterdam excel the brick pavements—they are smoother. However, they are smooth not because they are asphalt, but because they have the concrete foundation; they have the solid foundation. Why an asphalt pavement should be laid here where brick is so much better and cheaper I am unable to understand. A brick pavement laid on the same foundation that is used for asphalt, viz: A seven or eight inch bed of concrete, would be quite as smooth, infinitely less slippery and noisy, unmeasurably more comfortable and humane for the travel of horses, quite as clean and a good deal cheaper, than which nothing more can be said for any pavement. I have never felt like saying this about brick pavement before. I have never been in a position where I could speak with facts back of me. True brick pavements have had extended use in America, but nothing to compare with what is common to Amsterdam. Farthermore, as far as I know, brick pavements in America have not had extensive tests extending over long periods alongside other first-class pavements. This is important. Here, however, the facts are quite the contrary. The other paving material has been better laid and better cared for than brick. The two have been used together. The results are before us. We see brick pavements on narrow streets where the travel is very much concentrated. We see it in the middle of street car tracks and as the covering, as well, for wide boulevards. Altogether it has an extensive use. I saw some pavement in Brussels that was laid properly. It was on a concrete foundation. It was smooth, easy riding showed no evidence of wear and was altogether satisfactory, as such things go. The brick of this section are not as

well made as those of middle and western France, and are certainly not so strong and well made as most of the brick of America. The brick of France, of which I speak, have a fire clay quality. I use this expression in default of a better descriptive term. They are the same kind of brick that we get in some sections of our country where there is a certain proportion of fire clay mixed with the common clay. In the brick, of which I speak, it appears to add a flux which renders them measurably impervious to moisture. The brick of Northeastern France and a part of Belgium and Holland are not of this character. They are the ordinary absorbent brick made by common methods. Still they are well burned and carefully made so far as their knowledge goes.

I spoke of the individual character of the architectural uses of brick in this section. I did not wish to convey the impression that stone is not used. In the more ancient structures stone was used to a very moderate extent but did not influence the character of the architecture. The use of stone was subsidiary; the character of the design was made by brick, and in that sense we have a distinctively brick architecture by people who were not hampered by too abundant material resources, yet with experience which led them to intelligently use what was before them. As the outgrowth of this we have buildings constructed to suit the particular requirements of this people: gables to the street, beautifully decorated, striking and graceful in outline; window caps, door trimmings, string courses, cornices, pilasters, all in brick substantially constructed with an artistic instinct which combines to make generally pleasing and satisfactory structures.

I had hoped to send photographs with this letter to illustrate what I mean in a more definite way than is possible with mere descriptive matter. However, I have been unable to lay hands on those sufficiently clear as prints or exact enough in detail to accurately reproduce. Photographs which one buys in this section are not of good character. However, I have a number of small, ordinary photographs which I shall be able to work into the form of drawings for the *CLAY-WORKER* at a later date.

One thing which the high price of stone has done for the Dutch builders is that it has led them to be very careful in the preparation of their mortar. It is quite common to see gable copings, window sills, wall copings made solely of brick, and not withstanding the fact that many of these buildings date from the sixteenth and seventeenth centuries, we find no evidence of decay in the mortar in the weather joints. Apropos of this same subject I bear in mind that I have seen in France rubble stone walls with brick copings and not uncommonly rubble walls with brick trimmings and

decoration for the various openings and architectural features.

From Amies in France, northeast of Holland, one sees the proportion of tile roofs constantly increase—until he reaches Holland where he finds the tile roof the universal covering. Slate is not thought of. To be sure it could be secured by hauling it by railroad what would be relatively a short distance in our country. The tile roof was developed centuries before the railroad. Its value was long ago known. There is every reason why there should be no change. This tile is yet different from anything I have described—very simple and very picturesque. As the opportunity presents itself for making careful drawings thereof they will be published in these columns.

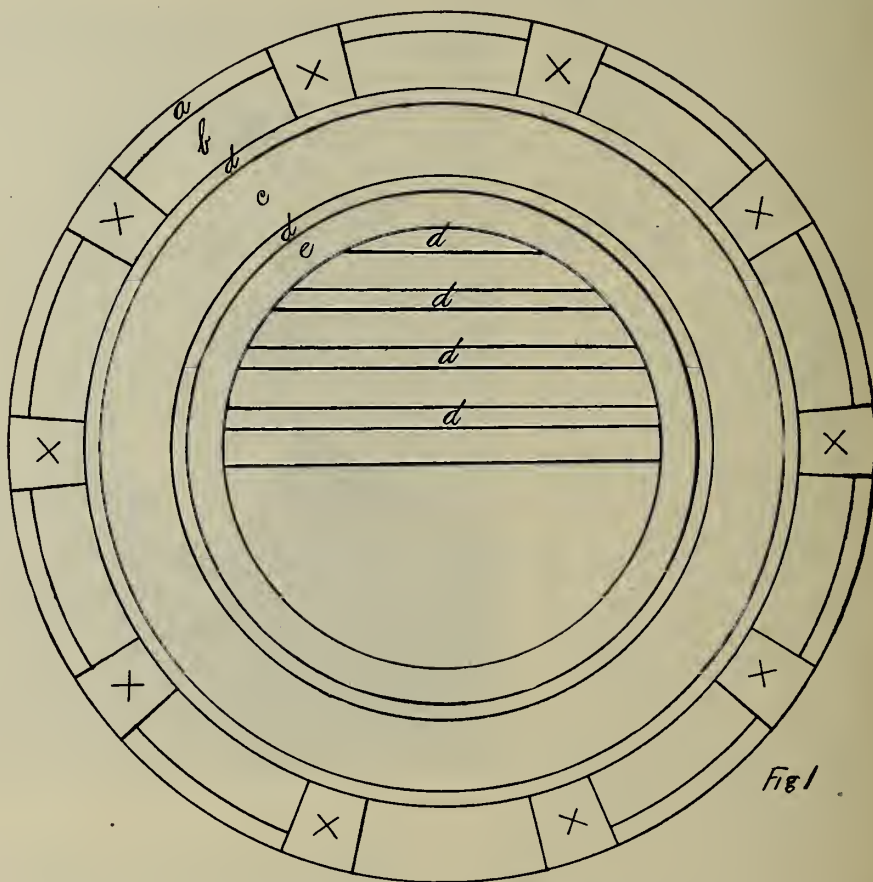
brick pavement the brick not sufficiently hard for pavers could be laid in the concrete flatways and thus form a part of a substantial foundation, at the same time that it would market this slow selling material. **LOUIS H. GIBSON,**
Amsterdam, Dec. 26, '91.

Written for the *Clay-Worker*.

ENAMELING BRICK.

No. 8.

WHATEVER kind of kiln it may be in which the enameled bricks may be burned, there is no question that setting plays an important part in producing good brick. I have seen the spirit level, the straight-edge and plumb rule used in setting brick, but it has been when they have been set in a building. I never



a.—Space between the first blade of bricks and kiln wall. b.—First blade of bricks. c.—Second blade of bricks. d.—Third blade of bricks. e.—Spaces showing the course the fire takes through the bricks.

Throughout this section I have noticed a very simple form of bevel edged brick which are used for side-walks, courts and, in some instances, for streets. These brick are about five inches square with a half-inch bevel on all edges, and at times a V shaped groove the depth of the bevel cut through in both directions across the face of the brick. This prevents them from being slippery for ordinary foot travel and gives a particularly good footing for horses. However, this is not the usual brick used for street paving. The latter are, if anything, a little thinner than our brick and are set on edge.

I have to suggest that in laying a

heard of these instruments being used as a guide to setting brick in a kiln to be burned. Nevertheless it is important that they should be set level and straight in the blades and a man up to the mark will do this without wasting his time with any such folly, and a man that cannot do this is only an apprentice hand, and should immediately set himself to learn over again. In setting enameled brick the one special and all important thing to consider is the protection of the glaze from anything that is calculated to injure it and spoil the bricks. We will suppose that the kiln is a round one of 20 feet in diameter, and whether round or square, most

manufacturers prefer putting a curtain wall along or all around the kiln, as the case may be. Now this curtain would be a 9 inch wall all around the kiln with a 9 inch space between the kiln wall and the inside of the curtain, and this should be taken up to within 6 inches of the springing of the arch. You will see that this arrangement will reduce the diameter to 17 feet; this is not

a perfectly level bottom laid and a blade of bricks set between the bags with headers and stretchers alternately. This blade should come up flush with the front of the bags, which will give about four inches between the kiln walls and the back of the bricks for draft. Both ends must be made up with ordinary bricks, and the top when reached, which should not be more than one brick, on

In my next paper I shall give reasons for and results arising from these methods of setting, with some directions for burning, which I think will close this series of letters on enameled brick-making.

MANAGER.

FIRE CLAY ROOFING TILE.

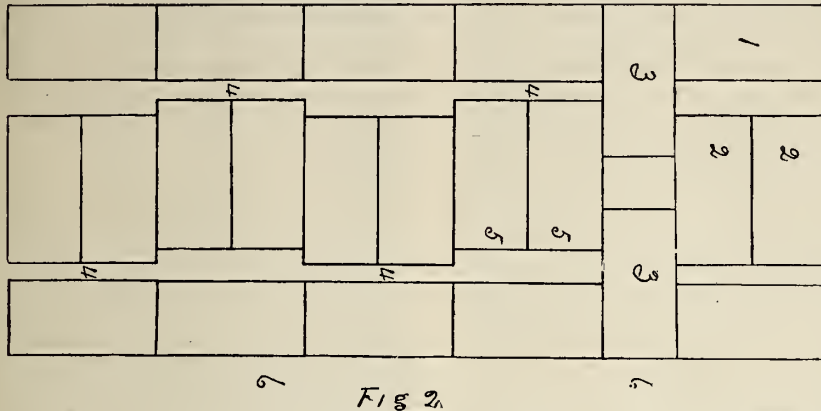
Although the subject of Roofing Tile may be new to many of you, still it is not a new industry. History places tile for roofing next to brick and pottery, in point of age, and the use of these three articles, manufactured of clay, can be traced back many thousand years. It is not my purpose to go back to the heathen ages to tell about tile and its use; but it may be proper to say here that tile roofs are now on old churches, in good condition, that have been there for over one thousand years; and it is not uncommon to see, and some of you may know from family traditions, roofs that have been in use, and are now in good condition, that have been there for five, six and seven hundred years. The only benefit to be gained from these facts are to show the lasting qualities of burnt clay—that it will exist in good condition as a building material, when iron, wood and stone have all gone back to their original elements.

In some countries in the Old World tile is almost the only roofing material used. They know and have tested its value and have faith in them. This is not the case in this country. Our people have not been building houses, as a rule, for their great grand children to occupy; our structures are more temporary, cheaper and less durable materials have been used, and the consequence is, our roofs and our buildings are short lived, and there are very few buildings standing in any of our cities to-day that are one hundred years old. Fire, the elements, fashion, continual changes, cause buildings to be torn down before they are mellowed by age, and our cities are built and rebuilt over and over again, at an enormous expenditure of time and money.

I am glad to note that a change is going on in this country in this respect. More attention is paid now to the character of the materials used in building than ever before, and the consequence is the products of clay, in every department of construction, are taking the front place for beautiful and durable buildings.

After the census reports are published we will know more about the number of factories engaged in the manufacture of roofing tile in the United States, but so far as I now know, there are not more than seven, and I am not certain there are that many. There are three in Baltimore, one in Akron, O., and the Clay Shingle Company's factory at Montezuma, Ind. Unfortunately the last named factory burned down in December last.

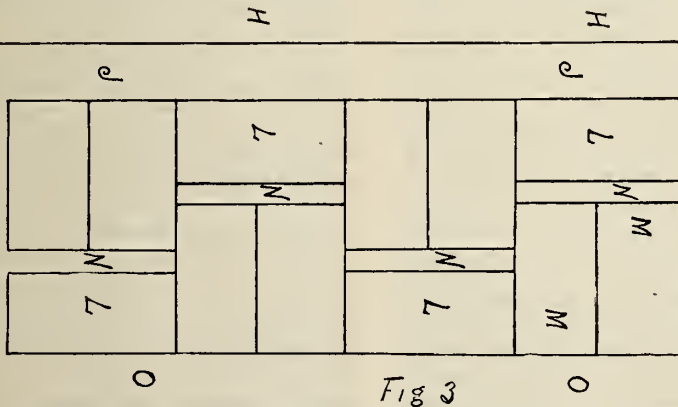
Paper read before the Ohio Brick and Tile Makers' Convention at Columbus, February 10, 1892, by John R. Elder, President Clay Shingle Co., Indianapolis.



1—Stretchers. 2.—Headers. 3.—Bond bricks to steady the blade. 4.—Glazed face of stretchers and headers. 5.—Blank end of headers. 6.—Space between the second and third blade of bricks.

my plan, in place of the curtains I should put up pockets, or bags. These bags should be put up with the very best fire brick there is to be got in the country, and, of course, the fire holes as, well, and if this is done four and one-half inch wall will be strong enough, if the fire holes are one foot six inches wide the bag will be two feet three inches over all, at or against the kiln wall, and they should project one foot and six

end, above the bag must be covered down close with burnt bricks, laid flat. If green bricks are put on top they will creep a little from each other and the draft will go down and spoil the bricks. When these spaces are filled up a circle must be drawn four inches from the front of the bags, and another blade four bricks in thickness must be laid down, and each course of bricks must be taken right around the kiln, leaving



H.—Kiln wall. J J.—Space between kiln wall and front blade of bricks. L.—Stretchers. M.—Headers. N N.—Glazed face. O O.—Space between the first and second blade of bricks.

inches from the kiln wall and be one foot six inches in front. This would give a clear space within the bag of one foot six inches by one and one-half feet and if, as there should be, there is ten fire holes to the kiln, it will give about three feet nine inches between each bag which can be set with bricks, which will burn as well as any other part of the kiln. Thus, you will see the advantage of having bags in preference to curtain walls.

We are now all right to make a start to set the brick, and first, there must be

only sufficient room through at the wicket to bring in the bricks. This blade should be set with stretchers outside and headers and all pattern bricks and odd shapes inside. This blade should take all the headers and odd stuff that would be required to match up one kiln of bricks, and the top of each blade throughout the kiln must be covered quite close with burnt bricks, as before described. For further direction see plan of the blades as set out on kiln bottom and end elevation of the two blades above named.

The company is now preparing to build larger works at Indianapolis, as being a more accessible point for the business. I have heard there is a new factory started in eastern Ohio, and that there is a factory in New Jersey, but of the last two I have no positive information. I can now announce for a certainty that the Trenton Terra Cotta Co., at Trenton, N. J., will be manufacturing Fire Clay Roofing Tile on a large scale within sixty days. It is a wonder to many that there are so few roofing tile factories in this country; and this wonder is increased when it is known that no factory is able to supply the demand within a reasonable time; and no factory can keep a stock on hand to fill orders on demand. It takes weeks and months after the order is received before the tile are delivered; and buildings are often exposed to the weather waiting for them.

It is now four years since my attention was directed to the manufacture of roofing tile. In that time I have read nearly everything that has been printed on the subject, given the question a great deal of thought and attention, and in the last two years have been in a position to know something of the demand for tile. The more I study the subject, the larger the business grows; and the more I am impressed with what an important industry is ready for the clayworkers of the country. If you will think that about one twentieth of the entire cost of the buildings of the United States is for the roofs, and that at least one in fifty of the roofs built each year would be tile if they could be had, and the weight of tile and cost were brought down to where it can be, you can see where this will run to in dollars, in the whole country. In Chicago alone the buildings in 1891 amounted to over \$54,000,000. This is only one city in one State.

By far the most instructive and interesting reading I have found on the subject of tile roofs are a series of letters written in France, by Louis H. Gibson, an architect of Indianapolis, and published in the CLAY-WORKER during the last year. Mr. Gibson is practical; he understands his business, and his letters describe the different kinds of tile used, where and how long they have been used, and their value for covering houses. I could not interest you more than by reading some of Mr. Gibson's letters. I will not take your time to do that, but will read two short extracts, in order that you may have a better idea of the true value of clay roofing tile.

He says: "The arguments in favor of a tile roof are too old and too numerous to need anything more than mere mention. If we stop to think about it, we know that the roofing material in general use is far from satisfactory. Slate, at best, is a temporary roofing; it is readily effected by heat, so much so, indeed, that a little heat will expose all the woodwork of an ordinary roof to the action of fire. Shingles are as inflam-

able as it is possible to arrange the same amount of wood. Slate and shingles, as we know, are the general roofing materials. Tiles, being a clay product, afford protection to all woodwork under it in a perfectly satisfactory way. The heat does not effect the tiles in the least. Frost effects them much less than slate. The covering of a roof with tile practically means not only the protection from the elements, but, as well, protection from conflagrations, or any unusual or dangerous degree of heat. Heat, as we know cannot effect burned clay products. This quality, together with its ability to resist other elements of nature, renders it the ideal building material. Its qualities of this character are quite as apparent for roof covering as for other use. For some reason, not easily understood, tile roofs have not been generally manufactured in America. While the field is open, and while there is a general demand for the material, it is not satisfied. There is a difficulty in securing a satisfactory tile roof at a moderate price."

Again he says: "A tile roof is one covering which will stand for years without expense or attention. No one has a right to dispute this. There are not two sides to this question. A tile roof is permanent; other roofs are temporary. History sustains any statement which may be made as to the permanent quality of such a covering. History confirms the temporary character of other roof coverings. A covering which is superior to tile remains to be devised. When we can look back and see a roof which has been in use for five or six hundred years, why concern ourselves? Why look for something better? * * So much for tile covering. * * The natural color of a tile roof is red. This color is imitated in our metal and wood roofs. Red always makes a good line against the sky, and makes an agreeable complement against the green of a landscape. It is a natural, proper combination. Never offensive—always harmonious. Here we have four or five hundred years of history, proper decorative qualities, good color, harmony with nature, and everything to commend it."

Mr. Gibson has illustrated many of the forms of tile used in Europe. There are many patterns, but as a rule they are heavy and expensive, and are generally laid in cement. The same general style has been followed in this country. This is one reason tile has not been adopted more extensively here. Another is that shingles, slate, tin and iron roofs, although temporary, and lasting but a few years at most, are cheaper, and can be obtained without delay.

As we grow in wealth, we want something better, more permanent and enduring, and there is nothing that will meet these wants so well as tile. Of course tile are not intended for the cheap and temporary class of buildings, but if you consider the great number of national, state and county buildings erected each year that contain records

of value, and where protection from fire is so important; the railroad stations and freight depots, where millions of dollars worth of goods and property are constantly stored; the schools and colleges of the country; the churches; the state and county benevolent institutions and hospitals; the hotels, where so many disasters in late years have called attention to better protection from fire; the manufacturing establishments of every kind; the large business blocks so full of valuable goods in cities; and the large number of elegant private residences built every year, you will see that a market is open for tile roofs, as soon as they can certainly be had, at a price within reach.

I know what I am saying when I tell you that tile can be made that will be fire proof, rain proof, snow and frost proof, lighter than slate and better and more durable than any other class of material now used for roofing, at a price that will bring it within the reach of all the above named class of buildings; and I hazard the prediction that it will not be many years before it will be used on the very large majority of them. It is astonishing how easy it is to make tile, and how cheap they can be made, when you know how. I do not refer to the old form of tile, nor the old style of making and burning them and putting them on the roof. For 1891 years, at least, the old style has prevailed; but a new era is now opening that will produce the changes I have predicted above.

At the request of the president of a railroad with which I am connected, on which there are valuable deposits of clay that he wanted attention called to, I visited a gentleman living in a small town in the western part of our State, and had my first talk on the subject of tile for roofing houses. I found a very intelligent, pleasant gentleman, a mechanic, that depended on his labor to support his family; a genius in the use of tools, and with with a large head full of good practical knowledge and inventive ideas. For several years he had been using all his spare time and money in experimenting on a roofing tile. He had good clays at hand, and a fire brick factory near burned the forms as he produced them. He made a variety of patterns and forms, and when he got one good point he retained it, and looked for another. He discarded old forms of tile and looked for something new—a form that would retain all the valuable and durable qualities of the old, and yet be lighter and stronger—that could be made by machinery, and burned straight and true without loss. A form that would not require skilled labor to manipulate, but could be formed by machinery as easily as brick. He found what he was after. He found that no inventor had discovered his principal to secure the desired article. He succeeded in getting his forms patented, and he has followed the first patent with

others, until he now has five, and others still pending. I refer to what many of you know as the Donaldson patents. The tile made under them is called the Fire Clay Roofing Tile, and they are manufactured by the Clay Shingle Company of Indianapolis. To manufacture an article of general use, and for which there is a demand, requires three very important things—brains, machinery, money. In Mr. Donaldson's patents are embodied the brains; the machinery is not very expensive, and is made by Ohio men; and for the rest, we have so far been able to furnish all that was required of that.

At our factory fully two years were spent in experimenting; in the mixture of clays; the manner of working and drying, but particularly in burning. But in the last year we made tile; we had passed the experimental stage. We made them up to the full capacity of our plant. We got down to business, and I am sorry to say our factory burned down, or we would be glad to show you how easy it is to make tile after you now how. We will have a larger and better arranged plant running soon, and be in shape to invite visitors to see us.

It is very much easier to go through the wilderness after the timber and brush are cut down and the road opened. It will take a very large bank account behind you, if you start to make roofing tile without knowing what you are about—to start from the mud bank and feel and grope your way from one point to another, until you produce a marketable tile. I have some friends that tried to go over that road; they found it a hard road to travel, and soon got to the end. If you want to start in the business, buy experience from the successful man—pay for it. You can't pay too much. It is cheap at any price, if it is of the right kind.

For the last year I have been in a position to learn the probable demand for tile. Our company started with a new and untried article. To many it seemed an experiment to use it, that might prove expensive. We did not advertise extensively. Our printing bill was not large. We run our works up to full capacity of three kilns, hoping to be able to get orders, and supply them promptly as fast as they came. By midsummer we had what we thought a very large stock on hand. In October we were obliged to decline orders. From the start inquiries came from all over the country, and orders followed inquiries. The demand was, in every case, for the better class of buildings. One roof in a city created a demand for more. The price and weight of tile will justify shipping long distances. The few factories now running have tile roofs in every State in the Union—from Maine to California, and from Michigan to the Gulf. Early last winter we spent some time seeing architects, trying to get them to adopt our tile and put them in their specifications. It was slow work. They liked the tile, and wanted

it, but the fear of delay in getting it in time made them hesitate. We succeeded in getting a roof on here and there. The tile did the rest. We soon learned the question was not to sell tile, but to make them. I tell you that is the question now. Make the tile, of a kind that has lasting qualities, looks well, and can be obtained certainly without delay; let the price be comparatively reasonable, and they will sell themselves faster than you can make them. The country is ready for them; the demand is unlimited, and will increase each year. This is the experience of our company.

Ohio, like Indiana, has large coal fields. It underlies many counties. The field extends over a great many thousand square miles. A great many men are employed in mining and handling it. It is a great business for railroads. A great deal of capital is used, and a great deal of money is made out of it. John Collett, of Indiana, has a national reputation as a geologist. He was for years the geologist of the State. He was one of the commissioners that built our State House, and finished it within the appropriation. He is an honest man, an observing man, and when he gives his opinion on any point I believe him. He told me it was his candid opinion, after a great deal of study, that the clays of Indiana and the products of clay industries were worth more to the State than the coal. If that is true of Indiana, it is true of Ohio. If you will investigate this subject and bring all the statistics you can get to bear on it, I think you will be of the same opinion as Mr. Collett. In Indianapolis alone 36,000,000 brick were used in building in 1891. This is but one item and for one city. If the census of 1890 were accessible, you would be astonished at the totals they would show. I mention this to show you what an immense branch of industry you are engaged in. What value and importance it has to the public; second only to agriculture. It is no small business, and every year it is increasing and extending. The clay ball has started rolling, and grows in size at each annual revolution. Keep it rolling.

Statistics on losses by fire tell some wonderful facts. You all pay insurance, and have some idea of what it costs. Of course the receipts from insurance exceeds the losses and expenses, or the companies could not live. In the last fifteen years the losses by fire in this country was greater than the present national debt. In the year 1891 the losses exceeded \$140,000,000. Now it would hardly be fair to claim that this \$140,000,000 would have been saved if all the buildings in the country that burned were covered with tile. But it is fair and right to say that the loss would not have been so heavy if more buildings were covered with tile. Mr. Gibson has told you that tile affords a satisfactory protection to all woodwork under it—that heat does not effect tile

in the least. In those countries where tile is generally used, the loss by fire is comparatively small. Now if these are facts—if tile is a protection from fire, in addition to being better to turn water, keep out snow and rain, and preserve the timbers under it from decay—you see the great advantage it has over any other roofing material, and you see why buildings containing public records; freight depots containing valuable goods; business houses containing large stocks; and residences containing valuable lives, will give them the preference over all others, and use them when they can get them.

It would hardly be right to open up the secrets of the profession in a public meeting, and tell what it costs to make roofing tile. I suppose some of you would like to know this, but I am afraid to tell you. I have no doubt you would keep the secret, and tell no one except your wives. But there are reporters around—these gentlemen that tell all they know, and sometimes a great deal more; so I will only say there is money in it. As a rule you clayworkers don't make so much profit as medicine men; or threshing machine men; or sewing machine men. Is not this largely your own fault? Is it not because there are too many of you? When one man starts a successful business, the other fellow gets after him, and three or four gets after the other fellow, until the business is overdone; the supply exceeds the demand; prices are cut, and the profits go where the woodbine twineth. That is what is the matter with clayworkers to-day, and it is what is the matter with every other business I know of, except those that are protected. Now, in the manufacture of roofing tile there is business enough and profit enough to satisfy any reasonable man. In our particular case the tariff protects us from foreign competition, and the patent laws protect us from home competition, so we feel reasonably secure. Still the business is so much beyond our capacity to supply that we will be glad to give the other fellow a chance, if we can find the right man in the right place.

Gentlemen, we are ready to be interviewed.

A Healthy Condition.

Editor Clay-Worker:

We enclose you \$2, subscription to THE CLAY-WORKER. Waukegan is at present enjoying a rapid growth not a boom but something to stay. The yards here are making preparations for another busy year. We use both stiff and soft clay machines with good success, dry on pallets, burn in old style kilns, burn them in 96 hours with good burns. Expect to put in a Dryer and use oil for burning next season. But could hardly get along without the CLAY-WORKER.

CHAS. SPALDING & SONS,
Waukegan, Ill.

Written for the Clay-Worker.

THE FUEL QUESTION.

No. 16.

DEAR WILL:—Having briefly pointed out some of the effects of atmospheric moisture, we will now proceed to examine some of the effects of atmospheric pressure, and incidentally let us see for a moment what would be the consequence of this pressure being withdrawn. First, it would be deprived of weight, for its pressure is due to its *superincumbent* weight, and its density or weight is due to its *superincumbent* pressure, each depending on the other. The terms weight and pressure must not, however, be confounded, for they are very different things; a cubic foot of air weighs only about $1\frac{1}{4}$ ounce, while a square foot has a pressure of over a ton. This pressure then is the weight of a column diminishing in density or weight as we ascend, until it reaches a height where it has no *practical* weight, and which is fixed by calculation at forty-five to fifty-one miles.

The atmosphere is represented as an ocean of air covering the whole earth to a depth of about fifty miles, and we are represented as living and moving about at the bottom of this ocean. Were it not for the pressure that existed at the bottom of this ocean we would have no draft to our chimneys, no pump or syphon action, no winds that could be felt, in fact no resistance in the air, and in short, the conditions of vegetable and animal life, as well as innumerable natural laws as we now know them would be completely upset.

We will cease speculating on these assumed conditions, etc., and turn our attention to actual phenomena resulting from small differences in the pressure at the bottom of our aerial ocean, and to a consideration of how the differences are caused, and how they are measured. First, then we are assured by the barometer that changes in pressure do occur, and taking this for granted until we have examined the barometer, the question arises, what occasions the changes? One very reasonable assumption is that this aerial ocean of ours is subject to similar disturbances as our water ocean is, and that the upper portion of our air is rolling about in huge waves, when the crest of one of these immense waves is immediately over us the mercury in the barometer rises, apprising us of the fact, and when the valley or hollow of the waves is over us the mercury sinks. This will do for a general accounting of the fluctuations of pressure, but there are other conditions to be taken into account presently. I have assumed you are quite familiar with the action of the barometer. I am well aware that thousands of these instruments have been bought simply as weather prophets and their readings confined to the few words printed on their dials—I allude now to the wheel barometer with round open

dial face and delicate finger or indicator pointing to "rain," "much rain," "fair," "set fair," "very dry," etc., as the case may be—the fact is, thousands only know this instrument by the name of "weather glass."

I remember well how I used to stand before my uncle's weather glass and ponder over the possible construction of such a mysterious piece of *furniture*. A few years afterwards I made weather prophets, quite as good as my uncle's. My instrument was known as a "Jack and Joan," and I think quite as reliable in the weather business, but not so refined and finished as uncle's. A piece of fiddle-string takes the place of the mercury in the barometer, and a nicely whittled piece of stick supplies the place of the delicate steel finger; the fiddlestring was tied to the middle of the stick so as to poise it nicely, and this was then suspended in a toy house so that the stick would swing around freely; the house and the doll figures on each end of the stick was, of course, a matter of taste; this embraces all the principles of construction. The action of the instrument depends entirely on the moisture *deposited* by the air. The pressure does not effect this instrument.

Let you should be only slightly acquainted with the construction and action of the barometer, allow me, briefly, to describe it. It consists of a stout glass tube about three feet long, which has been filled with mercury and hermetically sealed at one end—"hermetically sealed" means sealed air tight. The other end is stopped tightly with the thumb, and then this end is dipped into a small trough of mercury, the tube being made fast in an upright position to a piece of wood, which also has a shelf on the bottom end to carry the small trough of mercury, which is also made fast. There now, you have a barometer complete, except the graduation of it. You will find that the mercury does not fill the tube now; there is a space of five or six inches at the top with nothing in it. This is a vacuum, and the column of mercury in the tube is only about thirty inches high. This, then, is the column of mercury that will just balance a column of air of precisely the same thickness, and about fifty miles high, so that any fluctuation in the height of the air instantly causes the mercury to rise or fall as the case may be. A column of mercury thirty inches high and one inch square in section would weigh about 14.7 pounds, and as this is the weight of thirty inches we may call two inches one pound, and from this we are accustomed to call the pressure of air fifteen pounds to the square inch.

A barometer may be made of water or any other liquid, but the length of the tube becomes long and unmanageable. A water barometer would require a tube at least thirty-four or thirty-five feet high, but it is very sensible, and indicates the slightest change of pressure. The variation in the height of mercury

for this country is about two inches, while in England it is over three inches. In a water barometer these variations amount to nearly $2\frac{1}{2}$ feet and $3\frac{1}{2}$ feet respectively. Barometers and pneumatic inkstands are both on the same principle, and depend on a vacuum for their action.

The fiddle string and stick instrument is not a barometer, as it is only effected by moisture, and would therefore be more properly called a hygrometer, or water measurer of crude and rough construction, and only indicates moisture that the air has *deposited*. A better one, though quite as homely and rough, is made by hanging a small bag of dry salt on the end of a lath, and then poising it so that the empty end is the heaviest; any deposition of moisture will be attracted by the salt and the bag will increase in weight and raise the other end of the lath accordingly. These very simple things are useful and interesting in their way, and will give us a great deal of information, if we ask for it properly. The hygrometer of the philosophical instrument maker is a very different thing, and may be briefly described by saying: It is a peculiar shaped tube containing a substance with a very powerful attraction for moisture, and, by passing air through it, it—the air—is deprived of every particle of moisture, and the air in consequence leaves the instrument quite dry.

Some of these substances that have such an attraction for moisture are very largely used for that purpose in the arts and manufactures. The commonest and cheapest of these are quick-lime and sulphuric acid; both these are used very extensively to attract and absorb moisture from the air in rooms where valuables are kept that would be injured by moisture. For this purpose it is disposed about the room in shallow trays, and when it is saturated fresh trays are put in and the others taken out. The lime may be thrown away, but the sulphuric acid can be restored to its original strength by boiling, mark this, *by boiling*, and used over again. The causticity of the lime could also be restored by *burning*, but it would not pay to do it, where lime is so cheap. This suggests the idea of **DRYING BRICKS WITH A LIQUID**, and a *cold liquid* at that. This proposition, I am aware, will be hooted and scouted by some, and I would caution you against the conclusion that I for a moment entertain this as a *commercial* possibility for a brick dryer. It is, however,—as I have pointed out above—in daily use as a drier of other commercial products, and if you choose you may try it on a green brick, by putting said brick in a box, say one foot cube, set the brick on *end*, and put about one quart strong sulphuric acid in crocks that will stand on each side of the brick—four large glass tumblers will do first rate. Now close the box quite air tight and leave it for twenty-four hours. Then examine it for dryness, etc., and report to the CLAY-

WORKER your success. Close the box up again immediately after you have taken the brick out, and if you find it perfectly dry put another one in for twenty-four hours. If, however, it is not thoroughly dry, put it back for another twenty-four hours. I may be mistaken, but I think six or eight hours will be sufficient for the first brick.

I find I have wandered far from my subject, "Atmospheric Pressure," and cannot, in this letter, return to it, not feeling well. Yours Paternally,
HYDRO-CARBON.

THE POWWOW.

Without malice intent
But on mischief still bent,
A covey of brickmaking friends
Me' one night for a lark
In a city of mark,
Which furnished the means to the ends.

There were great machin(e)ations,
And kiln-calculations
And Dryers that new not the sun;
There were dry press and re-press,
Nothing to de press,
But plenty of brickmakers' fun.

Great speeches were uttered,
Like Demosthenes, sputtered
While shouts made the welkin to ring,
The tables were loaded
And every thing floated
Down throats that were ready to sing.

Some very rare things
In the brickmaking rings
Were stated as facts, not pretense;
As for ins and out, to mix
And hurn very good bricks
For a dollar and seventy-five cents.

Some good old men
Arose now and then
And quite in a good natured way,
Told us n' ver to part
With brickmakers' art,
As learned in our Grandfathers' day.

The band gave us music,
That made us all homesick;
The colored boys gave us a song.
Our troubles were drowned
In the merry go-round,
Of laughter and singing so long.

Ah! Life is worth living,
When spending an evening
With Washington friends on the floor,
In our hearts we do love them,
Grand brickmaking men,
And shall until Time is no more.

When our last brick is hurned,
When our last cake is turned,
And we've anchored our weather worn scow,
May we all again meet,
On the golden paved street
And hold an eternal Powwow.

—J. A. S.

The works of the Indianapolis Clay Shingle Company, at Montezuma, Ind., were burned recently. The company has purchased a tract of land and will build large works at Indianapolis, and arrange for the production of their clay shingle in large quantities. The demand, which is increasing constantly is already much greater than the capacity of the old plant.

CORRESPONDENCE.

THESE COLUMNS ARE OPEN TO ALL. THE FULL NAME AND ADDRESS IS REQUIRED BUT WILL NOT BE PUBLISHED EXCEPT WHEN PERMISSION IS GIVEN BY CORRESPONDENT. THOSE DESIRING TO COMMUNICATE PRIVATELY WITH ANY CORRESPONDENT WHOSE FULL NAME IS NOT GIVEN CAN DO SO BY ADDRESSING LETTERS CARE OF CLAY-WORKER.

THE RECENT ANNUAL CONVENTION

Views, Criticisms and Suggestions of a New Member of a Mathematical Turn.

Editor Clay-Worker:

I attended the recent convention at Washington. It was the first time I had been able to meet with my brother brickmakers, and since I came home I have done a good deal of thinking. My recollections of the convention were in somewhat of a whirl, and I have waited the official report to correct or verify my impressions, before making comments or criticisms.

Let me preface what I am going to write by saying that the National Association of Brick Manufacturers is an organization I am very proud to be a member of. I think there were only three in attendance whom I had previously known personally, but there were many whom I had known through the columns of the CLAY-WORKER, and whom I was glad to see and hear. I think I never saw a body of men more earnest and more enthusiastic, and for the most part the enthusiasm was entirely unselfish. Any suggestion or criticism I may make will, doubtless, put me in the kindergarten class, along with our young friend from Pittsburgh, who put his foot down his own throat the first time he opened his mouth. I had never seen Brother Dingee before, but there was a twinkle in his eye when he rose to reply that foreboded no peace to the man who "knew it all," who had been four years in the business and made no mistakes. But it was not the "four-year-old," as Mr. Dingee called him, nor the "old Philadelphia brickmaker" who took up the time of the convention.

I have been doing a little figuring on the Convention number, and I find that in the proceedings proper there are 50,389 words. In that portion of the proceedings devoted to the discussion of papers, etc., 25,050 words are used, and of this 25,050 words three men use more than two-fifths of the whole.

W. A. Eudaly	using	3,580	words.
John McCain	"	3,550	"
D. V. Purington	"	3,210	"

Or a total of 10,340

Now, Mr. Editor, I am more than willing to admit that very much that was said by these three men was appropriate and that it was well said. The point I make (and from many remarks I heard during the convention I am sure others agree with me) is that it is unfair to the other members of the Association that three out of some two hundred members should monopolize so much of the valuable time. I have

read all the past convention proceedings and I could not fail to be impressed with the similarity of the remarks of these three men in Washington to those the same men had made in previous conventions. In looking over the proceedings I fail to discover a single new idea advanced by any one of them. To use a slang phrase, they came well supplied with chestnuts, which, from the figures given above, were distributed with a generous tongue.

The following clipping from *The Inventive Age* might be read with profit by all of these would-be leaders of National Brick Conventions:

"The most successful statesmen are those who know how to say much in a few words. The country wearies of excessive verbosity. There are gentlemen in both ends of the Capital who are regarded as national afflictions by reason of frequent and long speeches."

I hardly dare suggest a remedy as the time may come when my frequency in attendance and familiarity with the proceedings of National Conventions, added to the garrulity that comes so naturally with advancing years, may make me justly amenable to the criticisms I am now so freely using. Would it not be wise to change or amend the by-laws of the Association prohibiting these men from speaking for two years, or, what would be better still, if a pledge could be extorted from them that they would be dumb for that length of time.

KEYSTONE.

How Best to Hire Help.

Editor Clay-Worker:

I should like to ask some practical brickmaker to give me his view, through the CLAY-WORKER, on the subject of hiring help on a brick yard. Is it a better plan to hire help by the day or by the thousand? Heretofore we have hired by the day, but it has not been satisfactory to us in all cases. What should we pay per thousand for the various kinds of labor? We have a stiff mud machine with a capacity of 20,000 per day, if kept going constantly for ten hours. We have a forty horsepower engine, use a corrugated crusher, from there the clay is elevated to a pug mill, then goes through a smooth roll crusher, and then to the brick machine. Our clay is of a soft soap-stone nature, and makes a fine brick. Our plant is located at the clay bank, so one man and team can easily plow and scrape the necessary clay for 20,000 brick, the clay is scraped on a platform beneath which is the corrugated crusher. One man will shovel the clay to the crusher, one man at the pug mill to temper, one to cut and set bricks on the trucks, three to wheel to the yard where they are hacked five high. Five wheelers and two setters will put these in our permanent up-draft clamps.

Are burners paid by the thousand or day, and what should a practical burner be paid? Also, can you inform us

where we can secure plaster paris molds in which to make flower pots, etc., or can you give us instructions to make same? Can flower pots be burned in with a common kiln of brick successfully? Yours truly,

W. W. CORNELL.

Steam Dryers.

Editor Clay-Worker:

In your February number of the CLAY-WORKER and under the heading of the fourth regular session of the National Brick Manufacturers' Association, on page 140 there appears an article on Steam Dryers which was read before the Convention by one Will. H. Coleman, which, while it is too absurd and ridiculous in expression to call for anything but ridicule in reply by any one at all posted in steam drying, yet for the benefit of those not posted, we desire to call attention to a few absurd statements made therein. Mr. Coleman's principal argument against steam dryers is based on the assumption that steam heaters, constructed of steam pipes, elbows, and return bends will soon clog up, unless the water, used in generating the steam, is of the utmost purity. Now, Mr. Editor, for the benefit only of those of your subscribers who are so illiterate that they cannot read, or those who have never examined or seen a steam plant of any kind in operation, we will consider this statement of Mr. Coleman's for one moment.

It is a well known fact that whenever water is heated above 212 degrees Fahrenheit it will vaporize, and this vapor we call steam, but the sediment or impurities contained in this water WILL NOT VAPORIZE to any extent, therefore if we draw off this vapor or steam from the generator or boiler, and by cooling it, we reduce it again to its original state (water) minus the impurities it originally contained, and as a consequence we then have only PURE DISTILLED, SOFT WATER as a product of steam, therefore how is it possible to clog up Steam Heaters, their pipes or fittings with CALCAREOUS deposits, or sediment? If these statements of Mr. Coleman's were true, then there would not be a single steam heating, drying, or warming plant in the United States but what would have to be torn out and replaced by new ever so often, according to the purity of the water from which the steam was generated, whereas the facts are, that of the many million steam plants that are in operation to-day, and that have been in operation for years, I have never heard of a single one ever being condemned or torn out, for reasons stated by Mr. Coleman.

Again, Mr. Coleman states that the Huyett & Smith Mfg. Co., B. F. Sturtevant Co., Boston Blower Co., and others have failed in attempting to dry brick with steam, or steam hot blast apparatus. This last statement is a downright falsehood and libelous in character. As Mr. Coleman well knows, the Huyett &

Smith Mfg. Co. have their Hot Blast Steam brick drying plants in all parts of this country, and the sales of our brick drying plants are constantly on the increase. The only drawback to their universal adoption by brickmakers generally being first cost.

In conclusion let us add that for a man "cradled in steam engineering" Mr. Coleman displays the most sublime ignorance of the mechanical subjects touched upon in his paper that we can imagine or else he is intentionally malicious, and in his spiteful efforts to injure, we presume, some personal enemy, he oversteps the bonds of decency by implicating not only by inference but by name practically all other manufacturers of steam brick dryers. It is perhaps superfluous to express any further opinion of Mr. Coleman's paper, as we believe he was fully appreciated from the action of the members of the Association when he appeared before them. Steam brick dryers have come to stay and such attempts as this can only react in their favor.

Respectfully Yours,

HUYETT & SMITH MFG. CO.,

Detroit, Mich., Feb. 15, '92.

The Glaze and Enamel Problem.

Editor Clay-Worker:

Bro. Gates, in his letter in November CLAY-WORKER, refers to the "unlucky man" who "has written you asking where he can buy glazing material." I am probably that "unlucky man." I wish, if possible, to get a glaze suitable for roofing tile. The improvements which glazing would make to this unrivaled material for covering houses, would, in my opinion, be very great. Not only would it effectually prevent any change of filtering, to which all neglected clay ware is, to a certain extent, at first liable. But the tile could be made somewhat lighter, and, also, would not make that considerable increase to its weight, which is otherwise certain to follow each shower of rain.

Though Bro. Gates does not "give it away" to any appreciable extent, there is much in his letter of interest to the student of "the enameling problem," and even of encouragement—"if philosophy could but find it out."

One remark of Bro. Gates' must cause a relaxation of the features of any one residing in Mexico, viz.: "Use inexpensive materials that can be duplicated." There are no inexpensive materials of this class in Mexico, and as to duplicating them, it is out of the question. The man is in luck who can get them once, and at any price.

I speak of imported materials. In the lead producing districts in the interior of Mexico they make a cheap glaze with which all the drinking and cooking utensils sent down for sale here are coated; but, as far as I can learn, they are quite up to the "universal practice of keeping these things close trade secrets." It is my intention, how-

ever, shortly to take a riding tour through some of these districts and see—what I can see.

The small jug I send you, as sample of this glaze, is sold on the plaza here at three cents, after being carried on men's backs from one hundred to two hundred miles. Its value where made is about one cent.

I note the graceful reference to "the recent articles you have been publishing on this subject," with which Bro. Gates concludes his letter. I may add that I am in correspondence with the writer of said articles, and though, from the enormous difficulty of doing anything of this kind in Mexico, I may not be able to reap the full benefit, I feel quite certain he is a thoroughly practical and successful enameLER, and that he can give most valuable advice and assistance at every stage of the process to anyone requiring same.

R. M. GREER.

Tuxpam, Mexico, Dec. 24, 1891.

How Brick are Burned in Russia.

Editor Clay-Worker:

In your issue of the CLAY-WORKER of September 15th, 1891, Bonhomie says: "If any of your able readers feel inclined to show up the Hoffman Continuous Kiln in a more favorable light, I for one will thank them to do so." With pleasure I will endeavor to show him the result which I have attained with continuous kilns. The same are not genuine Hoffman kilns but very nearly so; the consumption of fuel undoubtedly is just the same in my kiln as in the Hoffman kiln, in fact, there is very little difference in the construction of mine and the Hoffman kiln. The chief difference is I have built mine something lighter than Hoffman does and, consequently, they have not cost so much for labor and material. I used to burn four million brick in six months in 5 ordinary, open top kilns, in which we used to set 10,000 in each kiln. These kilns were fired on both sides from below, and it cost me for fuel in these kilns (up draft kilns) \$2.80 per 1,000, making a total for fuel of \$11,200 to burn four million brick. I built two continuous kilns. One has 16 chambers and the chimney is 120 feet high and 3 feet four inches in diameter in the clear (inside). There are about 50,000 brick laid in each of these chimneys, and about 500,000 brick are laid in the 16 chamber kiln and 40,000 in the 12 chamber kiln. The size of our brick is 10x4½x3 inches. These two kilns cost me \$17,600. They turn out daily with care, 12,000 brick each at a cost for fuel of 80 cents per thousand, which makes a total of \$2,400 for fuel to burn four million brick. You will see that the two kilns turn out daily 24,000 brick which is in six months 4,320,000. I find the kiln with twelve chambers to answer my purpose just as well as the one with 16 chambers, but this would not be the case where fat or strong clay has to be

burned. Good results with strong clays cannot be attained with less than 16 chambers. I think you will see that I have good cause to be well pleased with the results which I have attained with continuous kilns. You will see that in two years I have nearly saved in fuel the total cost of both kilns. Of course, the amount and interest of the invested capital must not be forgotten, but after allowing for same I have good cause to be satisfied with the result. It is needless for me to point out to you that a very different result would be attained if they were kept at work all the year instead of only six months yearly. The quality of my bricks is also much better now than they were when burnt in the old kilns. We, also, have fewer bats, because we can only set them 20 courses high in the chambers; in the old, open top kiln we used to set 36 courses high. I burn my brick with wood (pine, birch and elm). All brick works in this country with the exception of very small affairs, have continuous kilns. It is true that brick burned in continuous kilns are not of good color, but as the color of ordinary building brick is of no importance here, that does not decrease the price of them, because nearly all buildings in this country are plastered and when the brick work is pointed a pressed face brick is used. I have succeeded in burning good pressed face brick in my continuous kilns, (my brick are yellow,) but this is a very difficult affair. To attain this result the brick must be set in the kiln perfectly dry, and I set them flat (not on edge). It is not possible to burn more than 30 per cent. of faced brick along with the ordinary brick. The setters and burners must be thorough, good, trustworthy men who understand their business thoroughly. The least neglect on their part will spoil the face brick.

Trusting you will kindly excuse me for taking this liberty, I am,

Yours Sincerely,

W. TAYLOR,

Mitau, Russia, Jan. 15, 1892.

Facts and Figures.

Editor Clay-Worker:

Tradition tells us that we must welcome the coming and speed the parting guest. 1891 has been a visitor for twelve months, and one long to be remembered by brick manufacturers, who placed their product on the New York market. 1891 will be spoken of in the future by a number of manufacturers as the year in which I failed. We cordially speed 1891 a hearty and hasty departure in the oblivion of the past. We welcome 1892 with a hearty greeting in the hope that its untried visit has in store brighter times for those that manufacture brick, than its predecessor.

It is the nature of people to form impressions of one another by business or social intercourse. In some cases first impressions are not always correct.

Many articles of commerce improve with age, so may our association with 1892. Twelve months hence it may be of the most pleasant character. We have enjoyed his company for the past month but he is no improvement over his brother 1891. Rather worse.

At present writing there are but two weeks of returns from Building Bureau of Permits, issued for that period. And I sincerely hope that we may not have a like proportion for the rest of the year. Report as given, is to the effect that this year's are not the value or number of the past two years, and half the value for the same period of 1890.

I give the number of buildings erected in New York City, for the past ten years:

Years.	No. Bldgs.	Cost.
1882	2,577	\$44,793,186
1883	2,623	43,214,346
1884	2,812	42,215,420
1885	3,370	45,915,246
1886	4,097	58,479,653
1887	4,385	66,839,980
1888	3,076	47,142,793
1889	3,621	68,792,031
1890	3,507	74,676,373
1891	2,744	56,064,724

As your readers will see that '86 and '87 were the "Banner Seasons" for brick consumption. Since then each year has not made a very great show in the use of brick, and each year has seen new yards erected, thereby increasing the out-put. In Brooklyn for the year, 1890 and '91 there is a distinct falling off in the number of buildings erected:

Years.	No. Bldgs.	Cost.
1890	4,800	\$24,334,290
1891	4,302	22,356,690

Five hundred less houses and about two million of dollars less in value is a poor showing.

In a former letter I said that the production this season was low. I give the amount of stock on hand on Jan. 1. As will be seen on Jan. 1st, 1890, there was less on hand by ten millions than at the close of the present season. There was a larger production in 1889 and a proportionate consumption:

Jan. 1st	1890.	1891.	1892.
Haverstraw Bay,	105,000,000	114,000,000	105,000,000
N.Y. River Points,	69,000,000	110,000,000	86,000,000
New Jersey,	50,000,000	56,500,000	45,000,000
Long Island,	9,500,000	8,500,000	7,000,000
Staten Island,	3,500,000	3,000,000	4,500,000
	237,000,000	292,000,000	247,500,000

Your readers will see that there is about forty-four and one half million difference in the stock on hand at the beginning of 1891 as a result of less demand. The past year shows, I think, with its 247,500,000 stock on hand, a very poor out-look for the coming year. "The best laid plans of mice and men gang aft a-gley."

When Haverstraw Bay is used in the following statement, I wish your many readers not to think that the brick is taken out of the Bay. There was some

dumped there last fall, and will remain there until time is no more. It means that all yards on the bay, as at Croton, Cruger and Verplancks Point, their brick is classed Haverstraw Bay brick.

The amount of stock on hand is certainly sufficient to keep away all fear of a brick famine in the spring. Haverstraw shipped in 1890, 280,000,000, and had 84,000,000 left over. 1891 shipped 260,000,000 and has under her sheds at present 81,000,000 to start with.

At Haverstraw where their leases expired on the first of the year many of the clay banks have not been released. Micawber like, both parties are waiting for something to "turn up." This one, that brick may advance so that he may retain the old rent. The other keeping off in the hope that the landlord will come down in price. It is a waiting game all around.

As during times of depression there is more or less disagreement among business men. At Fishkill in two cases the parties had agreed to disagree. In our little community there is one dissolution, "Brick men will be in it."

In your August number I promised to tell how the "Red Diamonds" were disposed of in New York market. If your many readers have the time and patience to accompany me, we will take a trip, and see where the brick comes from. In summer we could take the Albany boats. As winter has closed navigation, we will take the cars. As we cross the Hudson at 42nd Street, we naturally look up the river, and we see the resting place of him who said: "Let us have peace." We board the train, in twenty minutes we pass Hackensack, with its out-put of one hundred million of good, hard brick.

We speed on, presently we hear the call "Tappan." What memories comes to us of the times when our fathers fought that we might enjoy liberty. On that hill to the left Andre was hung. In that church in plain view he was tried. In that old, stone house, Washington had his head-quarters. On we rush through a tunnel. As we emerge on the other side the "Brick-oplis of America" is in full view. We have a full view of the first yard. History tells us that not over two hundred feet south of this yard, Andre stepped ashore to meet Arnold. As we ride along we see one continuous line of brick sheds. We look to the west and see "Treason Hill." The house is in as good condition as when Andre and Arnold spent the night in it.

As we near Stony Point we think of "Mad Anthony." We here see a yard. From this point to the brickyard first spoken of is about three miles. In that distance there is 60 yards. On the east shore are Croton and Verplancks Point with a number of yards.

As we pass Jones Point another yard looms up. On through the Highlands, past Cornwall, one more brick producer is seen. At New Windsor the train passes in front of the yards. As we look back

of them we can see what inroads the yards have made in the bank.

It seems to me that if there is any hallowed ground in America it is in New Windsor. Here the army was encamped. Here the temple was erected, and on that plateau one of the grandest events in the world's history was enacted. When the crown of the king was offered Washington, and that sublime reply was made, "No King but God," stands unequalled to this day. On the east shore is Fishkill with its dozen or more yards. On with a rush we pass Roseton, Kingston, Glasco, Hudson, Catskill, Albany, all feeders to the New York market. Readers we have ridden one hundred and thirty miles. We will return by the N. Y. C. H., and take the P. A. R. R. for South Jersey.

As we ride along we see yards at Little Washington. We find without exception in the states of the largest producers of brick, Sayre and Fisher yards, with a close second Lorrillards, with numerous yards in sight, all having water communication with New York City.

We will take the boat for Greenport, Long Island. As we pass Cold Spring and Oyster Bay yards are seen. Huntington and Fresh Pond are in the procession as brick producers. At Greenport we find a large plant, and on Fishers Island is another. Although ninety miles from Gotham, some of its out-put finds its way there. Now we gather them in and see how many brick reaches the New York market in a favorable year when the yards are running up to their capacity.—One thousand million. Quite a few.

How is this amount of brick sold? Up to about the year 1860 the captains of the sailing vessels that carried the brick had what was called a market at the foot of Amos, now West 10th St., North River, where the vessel laid until a purchaser came along and bought. The captain then took his vessel to the place designated by the purchaser and discharged his cargo. The money was paid the captain, and he in turn handed it to the manufacturer on his return to the yard. As the city grew and the out-put increased, the market was moved up town and the commission man made his appearance on the scene. The captain had acted as a faithful agent without getting any pay for his services. He has to make way for a class of men that gets about all the money in the trade without any risk. If they assume any

risk they get well paid for it.

The "Modus Operandi" is this: The manufacturer consigns his cargo to the commission man. His charge is twelve and one-half cents per thousand for selling them without any guarantee of sale. He sells to a dealer who will give him a 30, 45, or perhaps 60 day note without interest or an indorser. The brickmaker may have made an agreement with the commission man that he is to receive cash, if that is the case, he sends him his check for the amount less one per cent. discount. Freight and commission are always cash between agent and buyer. If the agent should sell to a cash man, he would "extract his pound of flesh" by one per cent. discount. The agent would forward check as received.

So, it is plain that the agent gets the corn. The brickmaker the husks.

The statement when rendered will be in this shape:

200,000 Brick at \$5.00	\$1,000.00
Freight at \$1.25 per M.	250.00
Com. at 11 per cent.	225.00
Discount at 1 per cent.	7.25
Check to balance.....	717.75

Should it be a note transaction, the statement would show note to balance. The manufacturer would discount, and as has been the case many times before maturity—the firm has failed. The agent has had his cash for his part of the transaction.

What will the manufacturer have? He will have to take care of the note and bear the loss.

Navigation is completely closed on the Hudson at present, as well as the noble stream called the Hackensack. My last advices for the market does not contain the sameness that has been the case for some time past. It is to this effect: No arrivals; too cold to say brick. None to sell; consequently no price.

Later. A slight advance is felt in consequence of a complete close of shipment from all points except Long Island and South Jersey.

A. N. OLDTIMER.

Hollow Walls.

Editor Clay-Worker:

I am very much pleased with the CLAY-WORKER, being an enthusiast when it comes to machinery of any description, and the cuts in the CLAY-WORKER are certainly elegant. I am a mere novice in brickmaking, and wish

to learn all I can from whatever source it may come.

In regard to my experience in building hollow walls, will say that it is rather limited, but from what I have observed in over twenty years work at bricklaying and plastering, is of little if any benefit whatever, in the manner generally constructed, I claim they weaken the structure laterally; that is, we are carrying the weight of a four-inch wall the full height of building—properly speaking, without any bond; at least that could be called such. Now, the object of this hollow wall is to keep the dampness from the interior wall, but does it do it? I answer, no; not in all cases. The location of the building and the drainage of the site has a great deal to do with it. Too much shade around a building will cause it to become damp and unhealthy, whether of brick or frame.

If I wanted to build a brick building I would use for foundation all hard brick up to lower joist; would get the very cleanest medium, coarse sharp sand obtainable, and the very best lime, and make a good strong mortar of same; would use about one-half barrel of Louisville or some other good cement to the thousand brick, then put on a layer of slate laid in best Portland cement, then two or three courses of well burned brick laid in the Portland cement. Now, I think we have cut off capillary attraction from the soil.

Next, if I want hollow walls to be of service in keeping interior walls dry, I would place it inside the building. Let the wall be tied to outside wall in a permanent manner. Let it represent a series of flues, with a small grating near floor for draft. Now, if possible, connect it with flues on building; if not, build small flues in connection with fire walls, if business houses; if dwelling, let it out at attic, and I claim that would, in a great measure, do away with dampness that collects, owing to walls being colder and condensing the moisture in room, as the walls would be somewhat heated from the warm air in room, it would keep a circulation of air there by purifying the air in room, and consequently making it in every way more healthy.

Some fifteen years ago I plastered an addition to a brick house in Pike county, Ohio, near the town of Waverly. I cut out a section of wall to place a door frame in, and I found the brick very hard to cut and of good quality, mortar almost as hard as cement and

apparently as dry as a bone. That was in the old part of the house. The year before, the gentleman told me, he had it painted, interior and exterior walls, and used a great deal of oil on the outside of same, which would practically keep the moisture from entering the wall outside. This was an open winter and the walls were very damp. He wondered at them being so. He said he painted it to do away with that moisture; nothing more, as his wall presented a good appearance. It was a solid wall. I told him the cause of it. He said he would have saved his paint if he had known it.

I drew my idea of constructing hollow walls from an experience I had in building a bank vault, which was built out of very soft brick and loamy mortar. The firm carried their books home with them till they got tired of it, and wanted me to do something with it to dry it out. As it happened the vault was built up against a large flue, and I got me a bar of iron, drawn out to a chisel point, and drilled a hole into the flue from the hollow wall, and in a very short time the vault was dry, and the draft did it. A. H. MAXWELL.

Burning Brick in Detroit.

Editor Clay-Worker:

In answer to Mr. Brockriede's letter in January CLAY-WORKER, I will explain how brick are burned in Detroit with wood. Many brickmakers here use both natural gas and wood, and one or two use crude oil and wood. Good results are obtained with any of the three fuels mentioned. It takes at least fourteen days to burn an ordinary kiln with natural gas, and allow six days to cool. With wood we can burn a kiln of 540,000 brick in six days, allowing it to cool in four or five days. In other words, having the brick ready for the contractor in ten or twelve days. Of the twenty-five brick works located in this city, all but one burn nothing but up-draft kilns, which goes to show that up-draft kiln have the preference. In building up-draft kilns they are set 46 brick high, 128 brick wide, allowing 2,304 brick cavity for arch, making in all 27,136 brick per arch. They should be set three over three with sufficient space between each brick for good ventilation, for if one lap be set tight and the next lap with space, a cold spot will be the result, causing annoyance and soft brick.

The fire is started on both sides of

In and allowed to burn slow for two days, or until the water smoke has entirely disappeared. The fires are then drawn outside of arch doors and the fire gradually increased until a white heat is seen the whole length of arch. This requires two days. On the fifth day we change fires; that is, one side of the kiln is burned six hours, then change to the other side and fire six hours, and vice versa for two days more. When changing fires the side which last was burned six hours the doors are tightly closed, thereby keeping out any little draft which might leak in; thus, by keeping the doors air-tight the fire will go straight up the head or wall of kiln, making the head almost as hard as the body will be. On the fourth or fifth day one can see the fire through the platting or top of kiln. You are then sure that your kiln is nearly burned. Unless the brick on the top of the kiln were as hot as the bottom you would not see the fire through the platting. The settle which should attend a kiln of the above dimensions should be from four to six inches. I do not know if one could call this fast burning, but it gives surprising results in the way of hard brick. DOROTHY DALE.

A Foreign Market.

Editor Clay-Worker:

Why is it that some of your patrons don't try to introduce their machinery in this country? My idea is, some of the semi-dry and dry clay machine manufacturers make a mistake in not trying to push their trade in England. I believe a good many machines might be sold here by attending to the trade and getting one placed in a yard or two where the clay suits the machine. I believe a lot of money is in it if attention is given to it. I am quite sure that the dry-press machines illustrated in the CLAY-WORKER would sell if the press-boxes, plungers, etc., etc., were made the right size to suit the English brick trade. American machine makers may take it as a fact that there is money to be made here if they understand the market. R. S. B.

Peterboro, Eng., July 2, 1891.

Mixture of Clay.

Editor Clay-Worker:

The brickmakers in the vicinity of London mix lime in the form of chalk with their clays and by this means not only obviate the shrinkage but produce a yellow brick from clays which would

otherwise burn to a dark red. As the prevalent billious craze for yellow or buff brick is making buff burning clays somewhat scarce (near New York at least) it would be interesting to some of your numerous readers perhaps (to one of them certainly) to know if the attempt has been made in this country to make a yellow brick from a ferruginous clay by the admixture of lime either as carbonate or hydrate. Will not some of your contributors enlighten me, and oblige a NEOPHYTE.

Steam vs. Flue Driers.

Hydro Carbon:

Referring to your letter No. 13, where you draw a comparison between steam and brick-flue drying, the great advantages of the former system, in the economy of heat are so apparent, that I seriously think of adopting it in preference to the other very much less expensive method, in a new tile plant which I contemplate erecting this summer, if all goes well.

I would however, respectfully suggest, that in my opinion, the principles of the two classes of driers are so different, that it is perhaps, hardly fair to judge them entirely on their heat conducting merits. In the case of the brick-flue dryer, the ware comes directly in contact with the heat conducting material in the shape of a hot floor, and derives its heat almost entirely from conduction; while in the case of the steam dryer, it depends wholly on connection and radiation. In fact brick dryers appear to me to supply a very happy illustration of the different principles of diffusing heat; and one which will be very readily understood by all readers of the CLAY-WORKER.

Thanking you for the numerous very interesting and valuable pointers, so clearly conveyed in this and your previous letters, many of which I have already been able to practically test with very gratifying results. I am, yours filially,

WILLIAM.

P. S.—I duly gave your message to Bro. Greer, who requests me to say, that he is glad to hear you "have not forgotten him," and that he will look forward with pleasure to receipt of your promised letter.

The "Perfection" Continuous Kiln.

Editor Clay-Worker:

The writer some short time ago was invited to inspect a continuous brick burning kiln erected on a brick field

adjoining the Hamworthy Junction on the main line of the London and South W. Railway, the patent being owned by Sercombe, Osman & Warren of Poole, England.

This kiln is of the Hoffman type, containing 14 chambers, each 16 feet long, 11 feet wide and 10 feet high, holding about 250,000 English, sand brick when full, or, say, 350,000 American. For many years past I have considered it possible to modify in a great measure the large and nearly useless smoke chambers built to all continuous kilns, and was specially pleased to see how the patentee had carried this out, by placing the main flue below the centre division walls, fixing the dampers in the external walls and building the shaft detached from the kiln, thus doing away with the smoke chambers and the

arrangements there will be no soft or salmon brick, but all hard from top to bottom and side to side, and the brickmaster will not have to scratch his head or puzzle his brain to stop the waste that is half ruining him.

Any degree of heat can be obtained and the kiln is suitable for burning front and side building brick or vitrified pavers for street purposes, either made on a dry press, semi-dry, plastic, wire cut or by hand, and they can be stacked direct in the kiln if they are hard enough to bear their own weight.

Labor is economized in a great degree and in this respect the kiln is second to none; although it will hold 850,000 American sized brick, it takes but one burner during the day and one at night, and if two kilns were erected side by side, one man during the day and one

them from moisture before the smoke steam and gases of the kiln reaches them and prevents that staining which troubles so many Hoffman burners.

The kiln is suitable for either large or small yards, and can be so erected to burn any number of bricks from, say, 40,000 to 400,000 per week, the kiln at Hamworthy Junction taking 2 cwt. of smudge to burn 1,000 English sized brick.

I have inspected many kilns from time to time in all parts of England, but never was so impressed with the great utility and exceedingly small cost of any one and it will be a pleasure to me to give any further information either privately or through your columns.

By an arrangement, I would visit any brickyard in the United States or Canada and explain the workings of the kiln or superintend its erection. 28

R. S. BLUCK, 28

WOODSTONE BRICKYARD, Petersborough, England.



A CANADIAN BRICK PLANT—FANNING & FRIED, HAMILTON, ONT.

division walls, separating the burning chambers from the smoke chambers, curtailing the cost of the kiln by a considerable amount, permitting it to be roofed in for a moderate expense, without in any way reducing the number of bricks that can be burned in it. As an architect it agreeably surprised me to see the small number of brick required to build it as compared with other continuous kilns of a similar capacity and the very economical way the brickwork in its erection had been used.

The sketch shown on page 286 will allow progressive brickmasters to investigate it for themselves and see that it is the kiln to pay. With ordinary

at night could manage both of them.

The economy of fuel is great as compared with other continuous kilns, it being burnt with smudge or pit waste, but either gas, coal or oil could be used. One of the chief causes of the great saving is its top flue, by which the dry heat is taken direct from the cooling chambers and without passing through the burning and steaming chambers, thus getting loaded with moisture, is delivered in a dry state among the bricks as soon as they are placed in the kiln, and, without any extra expenditure for fuel, dries the brick before they are brought in contact with the approaching fire, and frees

A Canadian Brick Plant.

Editor Clay-Worker:

Please find enclosed \$2.00 for one year's subscription to the CLAY-WORKER, commencing with the February number. I want to say I am more than pleased with the sample copy. I should have subscribed before, but you know we are so slow that it takes us a long time to do anything. We commenced business two years ago, and had we been taking the CLAY-WORKER I think we would now be far in advance of what we are. Of course, we all think we know a great deal about the business until we go into it for ourselves, then we find we have a great deal to learn, and I think the

CLAY-WORKER can give us a great many pointers.

I send you a photo of our yard. We run two new Quaker steam power machines; our out-put is about two million. We are putting in racks, and we also are putting in pug mill, so we will be able to increase our out-put and make our brick cheaper. We have fine clay in this part of the country, and we make a good red brick, but they cost us too much to make. Our brick costs us about \$5.00 a thousand, and last summer we were getting \$6.25 a thousand. Now, we are selling for \$5.50, cutting each other. Not very good policy, is it? I wish you would write us a good article on this and send sample copies to all our manufacturers. Touch them up lively, it may have a tendency to do us all good.

F. FANNING,

Hamilton, Ont.

A Burner's Lot is an Unhappy One.

Editor Clay-Worker:

I have noticed in recent issues of the CLAY-WORKER several of your interesting writers have taken opportunity to poke fun at burners. If some of these literary inclined gentlemen will practice what they preach, and actually burn a few kiln of brick, they may see the matter a little differently and, possibly, acquire some information. I am a brick burner and recently have had a particularly hard experience, as you will see by the following: On the 30th of December, 1891, at six o'clock in the morning, I began firing a round, down draft kiln, completed the burn and closed the fires on the 8th day of January at six o'clock in the evening. I began on the second kiln on the 5th day of January at six P. M., and closed it on the 16th at 9 A. M. Fire was started in the third kiln January 23rd at 12 o'clock midday. Now, as you will see by this, the second and third kilns were lighted before the first and second had been finished. I live a half mile from the yard. I left home the 30th of December early in the morning, and did not return until noon of the 23rd of January. In that whole time I never once left the brickyard; my meals were brought to me and what little sleep I got was taken between turns near the kilns. Some people may think it is fun to burn brick in the winter time. I cannot regard it in that light, however; on the contrary, I think it is very severe and difficult work and at times extremely unpleasant, for by turns one freezes on one side and burns

on the other, and in bad weather the snow and rain is flying around you by day and by night. For my part I would rather burn the hottest day in summer than during ordinary winter weather. There is one thing, however, you seldom get very lonesome, for in our section, at least, there is usually one or more tramps hanging about every night looking for a warm corner.

I would like to hear from some of your practical readers as to whether they can dry off their brick without wood or coke; that is, burn with coal entirely, from start to finish.

H. H. B.

Detroit Items.

Editor Clay-Worker:

A report was circulated that the plant controlled by the Detroit Pressed Brick Co., was completely destroyed by fire, the rumor has no foundation as the Company is at present making brick and enjoying a brisk trade.

The prices remain unchanged which are as follows: Common Kiln-run Brick \$5.25; Selected Brick \$5.50; Sewer Brick \$5.50; Pallet Stock Brick \$6.00. There is about 40,000,000 brick on the market. Nearly all brickmakers are heavily stocked.

The past year has marked a decided increase for tile, the out-put does not supply the demand. The size generally wanted is four inch. The only tile maker in Detroit is John McDonald.

Considerable damage was done to the kiln-shed of Schmitt & Schmittshiel by the recent heavy snow storm, crushing in the roof, which was quickly repaired.

There was an attempt made to form a Stock Company composed of the Detroit Brickmakers. A committee was appointed composed of Messrs C. H. Clippert, William Cristie and R. H. Hall. Rules, by-laws, etc., were drawn. Several meetings enjoyed a large attendance; everything looked favorable, but for some reason it fell flat.

The veteran brickmakers predict a slim business for the coming year, they claim that each presidential election makes a dull year's business.

All the brickmakers use mud brick machines, mostly of the Henry Martin make. Greusel Bros., have added to their plant, and have been using the Duplex brick machine, made by F. Huetteman & Co. of Detroit, for two years; it makes a grade of mud brick second to none. Conrad Clippert also added it to both his plants. Haggerty

Bros. use no other. A. Lonyo also added one to his plant, as did also Haggerty & Proctor. They are especially adapted to make a fine grade of stock brick.

It is said that the brickmakers will discontinue the use of natural gas as fuel, unless the Natural Gas Co., reduces the price to \$0.80 per thousand. The price at present is \$1.00 per thousand.

DORTHY DALE.

NEW INVENTIONS.

The following is a lists of patents appertaining to brick, tile, terra-cotta, sewer pipe, pottery, etc., and the machinery used in their manufacture, issued since our last number.

- 466,763. Brick Machine—Noble T. Barnes, Buffalo, N. Y.
- 467,489. Hollow Brick Wall—Jas. C. Anderson, Highland Park, Ill.
- 467,813. Brick Machine—John A. C. Jackson, Pocahtontas, Ark.
- 467,981. Brick Kiln—George C. Little, Vance, Kan.
- 468,059. Brick Machine, and 468,320. Manufacture of Vitreous Brick, and 468,321. Art of Coloring Brick—Jas C. Anderson, Highland Park, Ill.
- 468,396. Brick Machine—Joseph B Mowry, Mansfield, Ohio.
- 468,651. Brick or Tile Machine—Egbert M. Freese, Galion, Ohio.
- 468,810. Brick Mold Sander—Esom O. Leach, Fairmount, Ind.
- 468,838. Building Brick, and 468,839, Paving Block, and 468,840. Interlocking Brick—Louis A. Stieger, San Jose, Cal.
- 468,872. Brick Handling Implement—C. Hansen and Carl Hansen, Chicago, Ill.
- 468,990. Building Brick—Jos. Rapp New Philadelphia, Pa.
- 469,151. Brick Kiln—Charles Klose, Doniphan, Neb.

A new terra cotta manufactory has been established at New Britian, Conn., a large factory is being erected near that city, and it is expected to be ready to begin the manufacture of architectural terra cotta early in the spring. The new company will be known as the New Britian Architectural Terra Cotta Co. The following officers and directors have been chosen: President, Philip Corbin. treasurer, C. E. Wetmore; secretary, G. B. Post; directors, Philip Corbin, G. R. Post, G. S. Barkentin, C. E. Wetmore and G. B. Post.

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T. A. RANDALL & CO.,

81 Massachusetts Ave. Indianapolis.

RESTRAINING COMPETITION.

We have been verbally criticised by one of our brickmaker friends for what we said in the Convention number of the CLAY-WORKER in regard to district organization and general organization with respect to restraining competition. This critic said: "We do not want restraints to competition. That sort of thing will make us weak. We are progressive; we are pushers; we accomplish a great deal; we explore new fields because of competition. Organization or anything which tends to reduce competition makes us less energetic, less progressive, less inventive and less alive to new fields, and to the demands of new business. You are wrong when you urge district or other organization for the purpose of keeping up prices. We sell more brick when brick are cheap. Hence, when you reduce competition you cut off progress. But for competition, we would to-day be molding brick by hand. Brickmaking would be in the same position that it was twenty years ago. We do not want district organization."

This is what our friend said. We acknowledge that there is a certain amount of justice in his criticism, if it is assumed that we wish to merely make an increase in the price of brick. That is not what we meant, and we are sorry that we expressed ourselves in a way to be thus misunderstood.

Unrestrained competition, we are able to prove, makes high prices. Proper restraint to competition makes low prices. It is the money makers in the brick business who are in the advance. There must be enough encouragement to investment to bring about proper mechanical arrangements. Where the brickmakers of the community are constantly draining one another in a murderous competition, it is there that we find a stationary condition; that we find yards which properly belong to ancient history. But let a spirit of change come over these same men, let them make a little money for a few years and there will be a great awakening. There will be a transformation. New machinery, new methods and new men in spirit. Better brick; cheaper brick; more profit. There must be an assurance of profit in order to bring about progress and success. The Standard Oil Company has done more to restrain competition in its particular line than any other organization. At the same time they have done more to produce a high grade and a cheap product than any other organization of their kind. As soon as an intelligent organization or firm of brickmakers get their plant in such shape as to make brick readily and profitably they do just what the Standard Oil Company did. They push for new business; they increase their field. In doing this they find it advisable to reduce prices within the limits of a reasonable profit, knowing as they do, that a large volume and a relatively more profitable business can be carried on in this way, than by demanding a larger profit and remaining in a small field.

One thing necessary to progress is capital. Capital, to most of us, comes through profit in our business. A murderous competition destroys profit. District organization develops a feeling of individual regard for our competitors, a feeling which is not present when we are disassociated from them. It brings about an interchange of experience, a healthy rivalry as to the character of product and an acknowledgement of the necessity for fair profits. In the realization of these profits comes the opportunity for improved mechanical equipment and through the help of this equipment we are enabled to find means of reducing the cost of output, the reduction of prices, the enlargement of our field without reducing profits. This is the history of the development of restraints to competition in this country.

HOW TO SUPPRESS ELOQUENCE.

Some of us talk too much. So thinks "Keystone," and he brings out statistics to prove it. He demonstrates by common arithmetic that three men did a very large proportion of the talking in the recent Convention. We cannot settle a matter of that kind because it is not in our line. It was only a few days ago that New York's social dictator, Ward McAllister, said that Chauncey DePew talks too much. But Mr. DePew does not believe it. Mr. McAllister puts it in this way: "DePew is more the ideal of what the society man of the salon should be, but he is too long winded, and that is where breeding comes in again, do you see, doncher know? Doncher understand? They wouldn't stand DePew at a dinner in London. He's too long winded. Good breeding and manners ordain that we must not absorb the conversation. One must be willing to listen to others. Doncher catch the point? Doncher know? Doncher understand?" Just the same Mr. DePew did not agree with Mr. McAllister. Mr. McAllister, as we all know, is at the head of a little social convention in New York, called the Four Hundred. Mr. McAllister has recently been going for that Four Hundred with a pruning knife. He has cut it down to a hundred and fifty. He left Mr. DePew and some of the other talkers out. Now we don't know how Mr. Ward McAllister would feel about it, but it might be a good plan for Keystone to employ Ward McAllister to assist in running the brickmakers' Convention. He is a poor devil, eminently respectable, but needs money.

It was ever thus in Conventions. A few men want to do all the talking, and it often happens that those who are so prolix are really, after all, the brightest people in the body. Nevertheless they do not know it all. They do not know how much to keep still. We think it must devolve upon the president to take care of business of this kind. He does not have to recognize a man every time he stands up to talk. If the too talkative members persist in being recognized and so embarrass the presiding officer we suggest that he might call upon his allies—the vice presidents, that's what they are for—to aid in suppressing the irrepressibles, or he might go personally to the over zealous brother and say, "You are an awful good fellow; I like you; you know more about brick-

making than any one I ever saw, but you talk too much." This is the way it might be done. There is no need of killing a man just because he will talk. Tell the brother that he is offensive in that way, while very pleasant and agreeable in others, then if that does not have the desired effect,—call on Mc Allister.

BRICK VENEERS.

A subscriber makes inquiry relative to the method of building combination, brick and frame structures, as follows:

1. Will any two story residence framed with five-inch studs (16 inches from center to center,) be perfectly secure if the exterior brick wall be only $4\frac{1}{2}$ inches?

2. In building a thin wall of this kind, how is it attached to the studding?

3. Is it necessary to lay a wall of this kind in cement, or will lime mortar do?

4. What thickness of brick wall is required in a one and two story structure, size of studding and the difference between studding, etc.?

A great deal of first-class building work has been done where a frame work of wood is used, and the filling in is of brick. Buildings dating back into the fifteenth and sixteenth centuries are to be found throughout Germany and France, where this kind of construction is very common. The small railway buildings out of the French roads, switch houses, storage sheds, often small waiting rooms and the smaller buildings for which railroads find abundant use, are frequently made with a four-inch brick wall set in between light iron work. In France one finds the same kind of construction used in market houses. Altogether there is nothing new about this sort of thing.

As to the first question We would judge that in this case the writer refers to a veneered wall. That is brick work in the outside of the studding. The usual way to handle this sort of construction is to sheath the wall the same as though one were going to weather-board it, and then attach galvanized iron anchors to the sheathing. These anchors should be nailed so as to attach themselves to every other brick in each fourth course. Sometimes in lieu of of galvanized iron anchors of sheet metal which are nailed to the sheathing, galvanized nails are used.

Maybe we do not understand the first question and are answering it under a misinterpretation of its meaning. May-

be the writer has in mind to lay the brick between the studding. As to its being perfectly safe the only question that arises is as to the character of the framing. It should be made strong. All of the light brick walls which we referred to in France and Germany are built in between the wood work and not on the outside of it. In this case it is necessary to make provision for attaching the brick work to the woodwork. This may be done, as stated above, by driving galvanized iron nails into the wood work so that they will catch in between each fourth or fifth joint. As to the third question: It is not necessary to lay a wall of this kind in cement. Lime mortar will do.

Fourth. A four-inch wall will do for a building of any height if the framing is heavy enough. The writer has seen buildings four or five stories high in France and Germany, where the filling of brick work is only four inches. As mentioned before, they were of Ancient origin. We shall be able to illustrate some constructions of this kind in the subsequent number of the CLAY-WORKER, but are unable to get out the illustrations for this month's issue.

THE OHIO CONVENTION.

The Annual Meeting of the Ohio Tile and Drainage Association held at Columbus, Feb'y 9th and 10th, was a very pleasant affair. The attendance, while not so large as in the good old times, when tilemaking was an infant industry and there was a great and crying need for information on all questions pertaining to the manufacture and use of drain tile, was sufficient to enable the progressive spirited craftsmen who gathered there, to engage in earnest and profitable discussion of modern methods and requirements. Several able papers were read which, with the discussions that followed, will be given in a subsequent issue of the CLAY-WORKER. The election of officers resulted in the re-election of J. W. Everal, Westerville, president; E. Biglow, Westview, vice-president; J. M. Justice, North Baltimore, secretary; S. E. Hagy, Etna, treasurer.

THE FREY-SHECKLER Co., Bucyrus, O., are sending out their thirtieth annual catalogue of clayworking machinery. It is a book of 150 pages and contains illustrations and descriptions of almost everything in the line of modern brick-making machinery. Our readers may obtain a copy by writing for it.

TRADE LITERATURE.

MESSRS. C. & A. POTTS & Co., Indianapolis, have issued a new and handsome catalogue of brickmaking machinery manufactured by them. A copy will be mailed to any of our readers who will send them their address.

THE MCLAGON FOUNDRY Co., New Haven, Conn., are mailing a new catalogue of their brick machines and general brick yard equipment. If you haven't already done so, write for a copy.

THE WELLINGTON MACHINE Co., Wellington, O., have out two new catalogues, either or both of which will be mailed to any of our readers who desire information on the subject of soft clay brick machinery. One of the catalogues is devoted to the "Monarch," a horizontal machine of novel design, for which many advantages are claimed; and the other to their well known "New Quaker" and other brick-making machinery.

THE DECATUR LEADER MFG. Co., Decatur, Ill., has favored us with a copy of their new catalogue of clay-working machinery, engines, etc., etc. Write them for a copy.

J. W. PENFIELD & SON, Willoughby, O., will be pleased to mail a new eight-page circular illustrating and describing their new No. 10 Auger Brick Machine, to any of our readers who will write them.

WE ARE INDEBTED to the Hydraulic Press Brick Co., St. Louis, Mo., for a copy of their 1892 pocket catalogue of molded and ornamental bricks. It contains cuts of an endless variety almost of special shaped brick, which they make in various colors to suit the requirements of the trade. Their latest specialty is called "Flemish Bond Brick." It is made $8\frac{1}{2}$ by $8\frac{1}{2}$ inches, and is a great economizer of time and labor, saving the work and waste incident to the clipping of press brick for binding corners as it is commonly done. It is also claimed that it makes a much stronger wall.

THE BONNOT Co., Canton, O., send us a neat circular illustrating their clay machinery, of which they make an extensive line. Their specialty is potters' machinery and supplies, and this little pamphlet is devoted mainly to this branch.

The Executive committee of the World's Columbian Exposition are negotiating with the Clay Shingle Company to cover the Indiana building with their fire clay roofing tile.

EDITORIAL NOTES and CLIPPINGS.

The Granite Clay Co. will build new brick works at Logan, Ohio.

A company is being organized to establish a brick plant at Cameron, Tex.

The Industrial Land Development Co. will erect brick works at Mays Landing, Pa.

Liston & Harris are going to start a new brick and tile factory at Carlinville, Ill.

E. H. Cook & Co., Grand Blanc, Mich., are going to enlarge their brick and tile works.

De Latter & Co., Nappanee, Ind., are thinking of putting in a dry press machine.

T. B. McAvoy and his son Frank B. will establish a paving brick plant near Lansdale, Pa.

Henry Schapenkoetter and others will likely embark in the brick business at Alton, Ill.

The Bertsch Brick & Tile Company, Fruitport, Mich., has been incorporated. Capital \$18,000.

Wataga, Ill., is thought to be an excellent point for the location of a paving brick plant.

The Tower Grove Brick works St. Louis, Mo., are putting in a four-mold Simpson press.

H. C. Gillick will put a new four-mold Simpson brick press in his factory at South St. Louis.

The Fulton (Mo.) Fire Brick and Mining Co., has been incorporated. Capital \$75,000.

The Diamond Brick & Tile Company, Kansas City, Mo., has been organized. Capital \$50,000.

The H. H. Schiwer Brick Company, St. Louis, Mo., has been incorporated. Capital \$30,000.

A. H. Gould, of Brewer, Me., is contemplating the establishment of brick works in Old Town.

Thos. Dale, of the firm of Dale & Davis, Potters, Trenton, N. J., died Feb'y 13th; aged 53 years.

The Portsmouth (O.) Fire Brick Co. may build large fire brick works at Tygarts Station, Carter Co., Ky.

The Canton and Osnaburgh Brick and Tile Co., of Canton, O., has been incorporated. Capital Stock, \$30,000.

Thos. J. Wood, formerly a brick manufacturer, died at his home at Mt. Vernon, O., the 13th inst, aged seventy years.

W. Eugene Harrison, Florence, Ala., contemplates establishing a small pottery there, and wants catalogues of machinery, etc.

D. B. Drummond special agent for the Simpson Brick Press reports the sale of

a complete dry press brick plant, equipped with Simpson machines to H. Brockschmitt, of Clifton, Mo.

The Moberly Brick Co., Moberly, Mo., are putting in a new 15 ton four-mold Andrus press. This is the second Andrus press for them.

Murrell Dobbins the well-known brick-maker of Philadelphia, was recently elected president of the Master Builders' Exchange of that city.

The Trenton (N. J.) Terra Cotta Co. has made arrangements to manufacture the fire clay shingle under the patents controlled by the Indianapolis Clay Shingle Co.

Wm. H. Alsip one of Chicago's best known and most successful brickmakers has been honored with the presidency of the Chicago Builders' and Traders' Exchange.

Thos. B. McAvoy, Philadelphia, ex-president of the National Brick Manufacturers' Association has been re-elected to the select council of his city for the term of three years.

The Zanesville, Ohio, brick manufacturers are liable to have trouble, the Bricklayers Union having requested them to sell brick to union contractors only.

The Clay Shingle Company have completed an agreement with the Trenton Terra Cotta Co., of Trenton, N. J., to manufacture their roofing tile to supply New York and New Jersey. This is a strong company, and they will manufacture tile on a large scale.

The St. Louis Pressed Brick Co., plant located at Peters, Ills., a few miles out from St. Louis, has recently added two double Whittaker presses and now claim that they are furnishing the finest quality of pressed brick and the greatest variety and finest designs and finish of shape and ornamental brick in use in the St. Louis market.

C. W. Larmon & Co., pressed brick manufacturers of Denver, Col., after many tests and careful investigation have decided that the Whittaker is the best pressed brick machine for them. They expect to fill all orders with bricks of the finest quality even if it requires the purchase of several more of these machines.

The Indianapolis Terra Works were recently awarded the contract to furnish the terra cotta work for the Medical College and State University building at Minneapolis, Minn., and for the new Insane Asylum at Nashville, Tenn. The latter order includes 1,200 superficial feet of highly ornamental modeled work.

The manufacturers of the Whittaker Semi-dry Brick machine call especial attention to the testimonial letters from those using that machine. One thing particularly they think worthy of notice: namely, that the Whittaker never breaks down or fails to produce with every revo-

lution its quota of brick of either plain or ornamental designs. It would be indeed difficult to make finer product than is now being turned out by the various plants using the "Whittaker," and still more difficult to sell any other machine to individuals or companies who have once tried the "Whittaker."

If you are going to attend the Mardi Gras at New Orleans, La., March 1st, 1892, do not forget that the Queen & Crescent Route is the only line that will run solid vestibuled trains through from Cincinnati without charge. For dates of sale, etc., call on any Ticket Agent and see that tickets read via the Queen & Crescent Route from Cincinnati to New Orleans.

R. D. Culver, president and general manager of the Wabash Clay Co., Veedersburgh, Ind., favored us with a call recently. This company is about to commence the erection of a paving brick plant in Fountain Co., Ind., where they have a large tract of shale and other clay suitable for both building and paving brick. They hope to have a finely equipped 50,000 a day capacity plant ready for operation by the first of May.

After using the Whittaker presses for four years the LaSalle Pressed Brick Co., of LaSalle, Ill., has doubled their capacity and have purchased new machines of the Whittaker folks and claim to be furnishing the finest quality of pressed brick both plain and shapes for much of the finest work now being done in Chicago. It would pay those thinking of building brick plants to visit these works and see the character of product they are making.

Carlisle & Co. of Opelika, Ala., write as follows: We are manufacturers of brick on the Chief brick machine, and make of soft clay which is yellow when green, but burns a bright cherry red when uniformly burnt hard. We want to purchase a re-press, and would like to know where and how to get and use the best material for drying brick a deep and uniform red color or any information in regard to the best method of coloring brick red.

Sealed proposals for furnishing and delivering hollow terra cotta roof and floor tiles for the building for Library of Congress in Washington, D. C., will be received until two o'clock P. M. on Saturday, the fifth day of March, 1892. and opened immediately thereafter in presence of bidders. Specifications, general instructions and conditions and blank forms of proposal may be had on application to Bernard R. Green, superintendent and engineer, 145 East Capitol street, Washington, D. C.

The Columbia Sewer Pipe Company, composed of leading sewerpipe men of this county, has bought and will sell the entire output of the following companies: The National Sewer Pipe Company, the Bucket Sewer Pipe Company

(Continued on page 258.)

== NEW HAVEN ==

Horizontal (Steam Power) Brick Machine.

Weight 15,300 Pounds.

Strongest Built in America.

MR MERWIN'S OPINION, 1890—FIRST YEAR.

BERLIN, CONN., October 28, 1890.

THE McLAGON FOUNDRY Co., New Haven, Conn.

Gentlemen:—Referring to the two “New Haven” Stock Brick Machines which you placed in my works this season, I take pleasure in saying that I consider them the best Soft Clay Machines on the market for manufacturing stock brick. I have several brick machines at my works, capacity of works being 160,000 brick per day, and having used your two Machines this season, will frankly say I am much pleased with their working, and I believe them to be the best Stock Brick Machine built. They will make the finest brick and handle a stiff clay with less trouble from wear or breakage of any Stock Brick Machine I know of. I have molded, in six months this season, on one of these Machines, 5,600,000 first-class pallet brick. The brick are superior in every respect. I shall at all times be pleased to exhibit the merits of this Machine to my brother craftsmen. Wishing you continued success, I am,

Very truly yours,

CHAS. P. MERWIN.

MR. MERWIN'S REPORT FOR 1891—SECOND YEAR.

BERLIN, CONN., November 3, 1891.

THE McLAGON FOUNDRY Co., New Haven, Conn.

Gentlemen:—As I promised you at the commencement of brick molding season of 1891, to report to you this fall my opinion of your “New Haven” Stock Brick Machine, I now take pleasure in saying, after two seasons' experience with them, I will repeat what I wrote you at the finish of the season of 1890, and, in addition, will now say at the close of the season of 1891, that I have yet to find a machine superior to them for molding pallet brick. Wishing you continued success, I am,

Very truly yours,

CHAS. P. MERWIN.

 Write for General Catalogue.

THE McLAGON FOUNDRY CO.,

NEW HAVEN, CONN., U. S. A.

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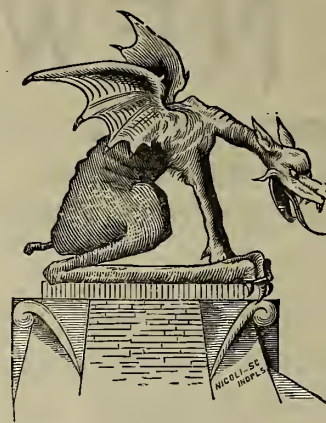
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BOOKS FOR BRICKMAKERS.

It is pretty generally conceded that wonderful progress is being made in the ancient and heretofore unprogressive art of brick-making. Among the best evidences of this is the fact that the brickmaking craft is no longer without a literature of its own. There are now some good practical books treating on the manipulation of clay—the making, drying and burning of brick. The list is not so large but that every brickmaker can afford to have them all. Get them and read them.

"BRICKMAKER'S MANUAL,"

Morrison and Reep, \$3.00

"BRICKMAKING AND BURNING,"

J. W. Crary, Sr., 2.50

"TABLE OF ANALYSES OF CLAYS,"

Alfred Crossley, 1.00

"DURABILITY OF BRICK PAVEMENTS,"

Prof. I. O. Baker, .25

Mailed, postage free, on receipt of price. All of them to one address for \$5.50, Address the publishers,

T. A. RANDALL & Co., Indianapolis, Ind.

THE CLAY WORKER.

THE OFFICIAL ORGAN OF THE NATIONAL BRICK MANUFACTURERS' ASSOCIATION OF THE UNITED STATES OF AMERICA.

VOL. XVII.

INDIANAPOLIS, IND., MARCH, 1892.

No. 3

Written for the Clay-Worker.

A SPECIMEN OF EUROPEAN ARCHITECTURE.

THE subject of our sketch is a great warehouse in Hamburg, a city famous for its splendid brick architecture. This structure combines beauty with utility. Certainly it may be known that no matter of exterior design effected the internal arrangements. It is a strong, vigorous, natural piece of brick architecture, and should stand as an appeal to all people to build something interesting, no matter for what purpose the structure may be used. A warehouse is not usually thought to be an attractive problem, yet here is one where the solution is really artistic. A mill presents about the same character of problem, and there is no excuse for an ugly mill. Certainly cost is never an excuse for ugliness. The real reason therefore is ignorance; a lack of resource. Good proportion costs no more than bad proportion. There is no problem in building, where building work is done substantially, that does not admit of artistic treatment, independent of cost. In this structure not one foot of stone has been used. All is brick, foundation and su-

perstructure. The window sills are of brick. The door and window trimmings are solely of the same material. A detail on the next page shows how one of these windows is arranged. The trimming which is shown in a darker

in color to assist in making the design successful.

Anything which can be done to make brick buildings more attractive will redound to the interest of the brick-maker. Now when we bear in mind that there is no excuse for an ugly building, that all may be attractive, when we all do our part to advance the standard of brick building we may feel that we are helping every one who is in the brickmaking business.

Good design does not consist in merely disturbing the surfaces, or doing unusual things. It comprises, in the first place, good proportion, then sufficient variety of color to bring the different parts into proper relation and harmony. Good design does not imply a different kind of a window for each story or different patterns of brickwork for the different sections. Great variety of this kind destroys what is called repose. It makes a building look disjointed, and is a defect in many structures. Take in this design, for



GRAIN ELEVATOR—HAMBURG.

color, is a salt glazed brick. The sill to the window is constructed wholly of glazed brick in the manner indicated by Fig. 2. The copings are of the same material, and with sufficient difference

instance, the same window design is constantly repeated, yet by a few touches of the designer's hand the different parts are framed in a way to give proper interest to all. In the main front part

we have a long line of doorways on each side of a group of windows. The lintels or sills have been set back so that there is a line above the principle story from top to bottom. This really makes one feature of each line of doors, and as is so beautifully shown in the cut, brings

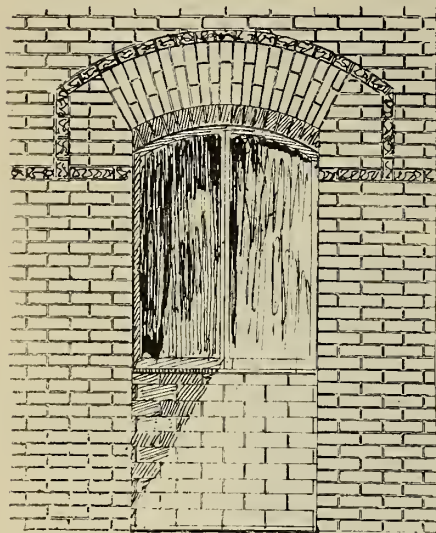


FIGURE 1.

in a splendid play of shade to emphasize and bring out, by contrast, the group of windows in the middle. Now if the sills to these doors had been run out flush with the wall so as to form a part of the window grouping, there would have been no natural relief, nothing to lend

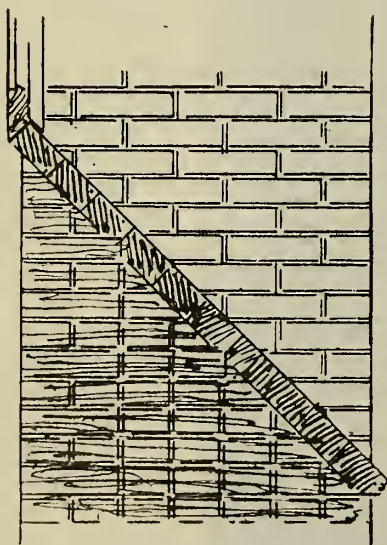


FIGURE 2.

interest to this facade. But, as it is, the lines of doorways make long, dark marks on each side of a group of windows which are gathered together by a simple brick arch which is turned over all of them. At the lower part of the struc-

ture the doors are separated by a space from those of the first story. The character of the windows is also changed. This has the effect of giving strength and breadth to the design at this point and allowing it to become gradually more fanciful as it moves upward. At the fourth story there is a slight projection of the brickwork in the space included by the windows. From the standpoint of design this is done very skillfully. Not enough is made of it to disturb the unity of the movement at this part of the design, yet sufficient interest is added to prevent absolute monotony. Altogether one can see, by taking this feature and studying it, that a great deal can be done by simply giving the right kind of thoughtfulness to design. The graces of composition are varied and well repay their studious employment.

It may be well to call attention to the fact that the foundation of this structure though going down into the water, is also of brick. One sees a great deal of brickwork in connection with sea walls in Germany and France. At Havre nearly all of the docks are made of brick and there is no evidence of decay or other disagreeable experience. The brick foundation is altogether very common in the old countries.

PREVENTABLE ACCIDENTS A CRIME

Some time since we were called attention to what seemed to be an epidemic of railroad accidents. We believed then that there was nothing permanent in the matter—that they would follow one another for a short time, as either reason or superstition points out that such things do, and that then there would be a relaxation. It appears that we were wrong in our supposition. No one expects at the present time to read his morning or evening paper without encountering accounts of from one to three accidents with which more or less of horror is connected. It has come to be time when some inquiry should be made into the cause of these accidents. We do not mean the usual coroner's inquest, but a governmental inquiry legalized by an act of Congress if necessary. There ought to be more light on the subject.—*American Machinist*.

What if the lesson be hard to learn!

The greatest tasks are not done in a day,
And always the prize that work must earn
Surpasses the prize that is won by play.

Written for the Clay-Worker.

REPPRESSED PAVING BRICK.

WE have noticed that the specifications for brick pavements in some cities call for repressed brick. Evidently this is the result of a desire on the part of the paving committee, in connection with the city engineer, to get the very best pavement that can be had for their streets. Unfortunately "things are not what they seem"—always.

It very often happens that the city engineer is one of the results of the local political machine and occasionally it falls to the lot of one who has given but little study to the matter of paving brick to prepare the specifications and superintend the work of paving the streets of his city. Very few engineers are versed in the mysteries of clay working, and it is but natural that they should draw conclusions from first impressions and sometimes from imperfect or incomplete premises. In addition to this it must be remembered that the city council, from which the paving committee is appointed, is made up of representative men, chosen from the various avocations in business, and while they are successful in their specialties the fact remains that very few of them are at all familiar with the modern processes of brickmaking, and consequently are not to be relied upon, in all cases, to come to the best conclusions and make the best selection in the matter of paving brick which is so foreign to their line of business. Opinions are largely formed from first impressions.

The natural conclusion is that a good brick is good under all circumstances under which it may be placed. Knowing that repressed brick are much sought for in constructing good buildings the inference is natural that they are superior for other purposes.

For fear of being misunderstood I will state here that I am not objecting to repressed brick for paving purposes, for under proper circumstances I consider repressing highly advantageous, but I do think that the unqualified requiring in the specifications that the brick used shall be repressed has a smacking of ignorance in reference to brickmaking.

Any one familiar with brickmaking and clayworking knows that many clays will make first-class paving brick without repressing, while others with all

possible pressing and repressing would never make a brick fit to be laid in a quiet street.

Of course, it is customary, and to be expected that those upon whom rests the responsibility will take the pains to investigate the subject and profit by the experience of other cities that are older and that have given the subject study and that have had experience of their own. This is good and in the right direction so far as it goes.

It is well known that repressed brick rank among the first for building purposes and that they are often used in the construction of good buildings, but the fact is not made prominent that the quality that recommends the repressed brick to the architects is their appearance, and not their strength and durability. It so happens that appearance is of no consequence whatever in paving brick, but strength and durability are everything. If a brick does not possess these it has nothing to recommend it for paving purposes. The smooth faces, sharp edges and square corners that are so desirable in repressed brick, and which have given them their high position in the estimation of the public for building purposes, are not only unnecessary for paving but on the contrary are objectionable.

A pavement made of such brick would be too smooth to offer points for the hoofs of horses to hold. Some of the older pavements that have done so much to give brick for this purpose so high a place in public favor, were made of brick having the edges slightly rounded.

Density is a characteristic of a good brick, and as repressing increases the density, the inference is readily and justly drawn that repressing will make brick better for paving purposes.

The peculiar characteristics of the clay effect the density of a repressed brick before and after burning and the fact that a brick has been formed under great pressure is no assurance that it will be dense after burning. Many clays contain organic matter in considerable quantities, and when the brick are being molded or formed by being pressed through a die this organic matter retains its position and in part its size. That is, the particles of organic matter are not removed or destroyed

but are only compressed. The density of the brick after pressing cannot be questioned, but when the heat of the kiln is applied in burning, this organic matter is consumed and disappears, leaving the space that is occupied before the burning of the brick, practically vacant, or, in other words, the density of the brick has been reduced just to the amount of the organic matter which it contained.

There is another fact that may exert a great influence in the density of the pressed and repressed brick before and after burning. Heat is an active agent in producing chemical action. Substances that will be in contact at ordi-



JOHN W. SIBLEY, TREAS. COALDALE (ALA.) BRICK & TILE CO.

nary temperatures apparently oblivious of each other for an indefinite period will, when heated, show affinities for each other, and as the temperature is increased will rush into the embrace of each other and form new combinations. Again, combinations of substances that remain satisfied in their union at the usual temperatures, manifest very decided dislike under higher temperatures, and finally the revulsions become so decided that the various constituents finally separate. After the dissolutions it often occurs that the different ingredients find others for which they have affinities and with which they unite to form new combinations.

Whether these new forms under which the materials appear will be of greater or less density than they were before being transformed under the heat of the kiln cannot be determined, and a brick that was very dense by being repressed may become of less density by the re-arranging of the constituent materials under the transforming influence of the heat of the kiln.

It is now generally conceded that all substances in nature have their points of fusion and of vaporization. An example with which all are familiar is that of water, which fuses or melts at thirty-two degrees and vaporizes at two hundred and twelve degrees Fahrenheit.

The success of scientists of late years in the liquefaction of gases that had heretofore baffled all attempts at reduction goes far towards establishing the theory that all substances under proper conditions of temperature and pressure may be brought to yield their testimony to the verification of this law.

The disclosures of the spectroscopic which show so conclusively the presence of many of our common solids in the state of vapor in the sun virtually proves, although it may be only inferentially that this position is well taken as to the volatileness of every thing in nature.

The Nebular Hypothesis is based upon this principal and truly has very much to substantiate it. This is quite a diversion, going from street pavements to the consideration of the wonders of astronomy, but like sin one thing leads to another, and the bars of the spectrum offers an easy and inviting Jacob's ladder that, in this case, has one end resting on a brick pavement

while the other rested against the extreme bounds of the "great unknown." On this, shall we call it "spectral" ladder, we see the minds and thoughts of great men ascending and descending in this work of establishing the unity of nature and making stronger the proofs that all is one great whole formed and guided by the infinite mind of Him who hath laid the foundation of the earth.

But to return to the burning of pressed and repressed brick.

It has been said that no two things are alike. Granting that every thing is volatile the fact appears that every thing has some temperature at which it volatilizes. These points are different

for different substances. Some of them may come within the range of temperatures reached in the kiln, and some of the constituent parts of the brick may be volatilized and pass off through the chimney leaving the space which they had occupied vacant. Doubtless this often does occur, and the weight and density of the brick lose just to the amount of the material volatilized. How much this is it is not possible to state, but it amounts to something in probably every instance where brick are burned very hard, and it varies greatly with different clays.

In burning clay wares we have often seen pieces that fell into the furnaces and were so thoroughly burned up that they were almost as light and porous as a fine sponge. In short, they were literally burned up,—volatilized.

If this occurs so completely in the furnaces it is fair to expect that it will occur in the kiln, although it may be in a less degree.

These thoughts lead us inevitably to the conclusion, although it may be unwelcome to some, that in all cases the condition with reference to density in which brick go into the kiln is not an infallible indication of their density when they come out.

All other things being equal the brick that are closely pressed in their formative period will be of greater density after burning.

The practice of allowing brick to become partially dry before repressing is decidedly objectionable in the manufacture of paving brick. If repressing makes the brick more dense it must move the particles relatively to each other.

This has a tendency to break the fiber of the clay and this necessarily weakens them and reduces their ability to resist concussion and abrasion.

In any case the repressing incurs an additional expense to the manufacture that he must lose or get from the purchasers by an increased price. This brings him in unequal competition with those manufacturers who do not have this expense, and yet who make brick that will give satisfaction and pass inspection at the hands of a great many city engineers who have the matter in charge, for the cases where repressed brick are specified are the exceptions and not the rule.

The fact stands stubbornly before the advocates of repressing paving brick that the earlier brick pavements that

were laid throughout the Western States were not repressed, yet these brick have stood the tests of years, and in the face of prejudice and the competition with block, macadam, asphalt, granite and all other paving materials have steadily gained in favor, and are yet the enduring foundations upon which the present boom in brick pavements is built.

It is possible that some manufacturers who have axes to grind may appear before the public and advocate the necessity or at least the advisability of repressing. This calls to mind an experience of the manufacturers of drain tile about ten years ago, and very likely will terminate in a similar way. Very naturally the first tile made were put upon the market by those who were already engaged in working plastic clays, viz: those operating potteries, sewer pipe factories, etc. As the demand increased factories sprung up in localities where the only clays to be found burned red. These factories supplied the local demand, and entered with spirit into the work of supplying the shipping trade.

The older manufacturers saw formidable competition in this and raised a great hue and cry about the lack of durability of red tile and advanced the idea that drain tile should be made of fire clay.

It appeared that the manufacturers of red tile had some brains and knowledge as well as energy. They immediately took up the gauntlet thrown down and soon taught those who cared to know, that fire clay was good for making fire brick but useless for making drain tile. The opposition saw their mistake and retreated, taking a similar position in reference to potter's clay, but by this time the work had gone on to such an extent that the demand paid no attention to the claims of the disgruntled pioneers, but went on improving their farms with those tile that were most convenient.

The case is not exactly similar for the first paving brick used, at least those in the Western States, were not repressed, and the manufacture of repressed brick for paving has been introduced later. D. W. STOOKEY.

BRICK FOR POWDER MILLS.

Bricks made of plaster of paris and cork are now used in the construction of powder mills. In case of explosion they offer slight resistance, and are broken to atoms.

FIRE BRICKS AND THEIR MANUFACTURE.

THERE is perhaps no branch of the clayworking industry that has clung so tenaciously to old and time worn prejudices as that of the manufacture of Fire Bricks. It can be no matter of surprise that this has been the case. These, unlike other branches of clayworking, are submitted to a severe test, and a failure in their refractory character entails such consequences and loss that users have need to be cautious about using a doubtful quality; and when it is considered the great number that have been induced to leave the old method of hand making and who have usually met with such signal failure it can surprise no one acquainted with the subject that old prejudice should continue to exist. Fire brick manufacturers, as a body, are equal with any others in their aim to keep abreast with modern improvements and changes, and it is not so much their fault as their misfortune, if time worn custom, in their own special line, still clings to them. They have tried to free themselves but the means they have adopted have only been disappointing, and perhaps after failing had to pay very dearly for their experimenting; they have gone back again into old methods and they have had no courage or disposition to make any fresh attempts at change.

Fire bricks must retain their high refractory character, and no saving in first cost of production will compensate for any deficiency in this respect.

Some four years ago a fire brick manufacturer in Scotland conceived the idea of making fire bricks of a high grade in such a way as to avoid the excessive cost involved between the raw materials being reduced to dust, and the bricks being set in the kiln, which he considered to be a great waste of expense, and which, if it could be avoided, would very largely reduce the cost of production. His experiments were tried in a very rude way but they were sufficient to demonstrate to him the practicability of his idea. He invited Mr. Johnson to witness his experiments and explain to him what he required. On the one hand he wished to avoid any tendency to vitrification in the brick, as that would inevitably be fatal to its

Paper read before the National Ass'n of Fire Brick Manufacturers, by Hervey Haigh, Superintendent of the Somerset and Johnsonburg Mfg. Co., Somerset, Mass.

character as a high grade fire brick, and, on the other hand, he could not allow the material to be made fine enough to permit of its being compressed into a brick in a comparatively dry state, as that would cause it to be friable and loose, and would find it difficult to handle and ship, and further would cause it to crack and break in the furnace. He must avoid both vitrification and friableness for the brick to be what he required it to be, and in his rude way he has succeeded in obtaining this result, and what he required of Mr. Johnson was to enable him to get the same results by machinery and in the most economical way possible. Mr. Johnson realized his idea and was able to supply him a complete plant which entirely met his requirements, and it was put into successful operation.

This new departure of the manufacture of fire bricks was a good deal commented upon in the Trade Journals at the time, and it was from the Somerset Potters Works accidentally seeing one of these notices which led to Mr. Johnson's connection with them, and their adopting the process which turned out so favorably with them that they at once took steps to secure an interest in the American and Canadian patents. The treasurer of our company, Mr. W. H. Sanford, at your last meeting read a paper on this new departure with them which will no doubt be remembered. They have since that time put in a duplicate plant, and they also are now erecting an entirely new works in another State for the manufacture of fire and vitrified paving brick which, when completed, will perhaps be the finest and largest of the kind in this or any other country. A number of other firms have also followed their example in erecting these plants, and adopting this process with equal success.

We do not need to describe methods which have been attempted, and which will still continue to be tried, in some cases by firms who have their own views on the subject, and others who are influenced by those whose interest it is to sell machinery. In addressing practical men, who are all more or less acquainted with all these matters, we do not need to offer any remark upon the efforts in this direction. You know whether the mud, stiff clay or the dry process give

the results which you wish for. We contend that our methods can be the only correct one by which the refractory character of the brick is maintained, together with the greatest economy in production. When we have been describing our process, then we have to say—that we do away with the intermediate drying, and take the bricks direct to the kiln as they are discharged by the machinery. We have found it difficult to make it clear to the minds of engineers that our method is other, or is different from the dry process, and our attempted explanations have rather confused than enlightened them, and it has appeared to them an alteration with-



H. HAIGH, SUPT. SOMERSET POTTERS WORKS, SOMERSET, MASS.

out difference—and we have had to close with the remark, "Come and see." They have not been able to conceive without actually witnessing the operation, how a brick can be made and taken direct to the kiln, without having been made on the dry process—perhaps it may appear in the same way to you—but we are able to state what may appear even still more paradoxical, when we tell you that we are now introducing a process for the manufacture of vitrified paving bricks, by which the bricks are taken direct to the kiln in the same way as by our method of manufacturing fire brick and yet they are more plastic than those made in the most plastic

way, be it by hand, or by soft, or by stiff mud machinery, that is, they are a more dense and close grain and ring, which the plastic method is supposed to give, and the bricks made by the method referred to, vitrify much easier than on any other method of manufacture. In their process for producing vitrified paving brick, the machine takes the dust clay in the same way as it taken by the dry press, and delivers a plastic pressed brick ready for going to the kiln. The machine doing the work automatically, or tempering, moulding and pressing the brick and delivers it with the best possible finish. To judge rightly on these matters, it will be necessary to see them in operation, which will not fail to maintain the views and to corroborate the description given. Returning again to the manufacture of fire brick. We have all of the simplicity of arrangement of plant, and a minimum of labor, that is found in making bricks with the dry press; but we have a distinct character of bricks, one that will neither vitrify so readily as hand, or soft made, nor be friable and over compact as those made on the dry press; but a brick giving just what is needed. A fire brick should be porous, and yet sound, and permitting of transferring and shipping without presenting that loose and crumbly appearance. The cost of producing fire brick by this plan, taking as a basis a plant with a capacity say of 65,000 per week, is \$1.75 per M., which covers all labor from taking the raw material from the stock shed to loading the brick from the kilns on teams or cars.

Any ordinary type of kiln can be used in our process, the same as bricks made on any other, but we are also introducing a kiln to which we invite your special attention, as we are confident that we have what is especially desired, viz.: "Quality with the greatest economy." The kiln may be termed a gas-firing-kiln, but it differs from all others. The kiln itself is made its own producer, and the gas is generated as it is required without any outside plant or producer, and the whole of the carbonic properties in the coal are so completely used up that not more than 400 pounds of fine slack is needed for burning 1,000 fire bricks, and for other classes of goods taking less heat for burning, a proportionately less quantity

is used. Heat sufficient to burn the highest grade and silica, is just as simply obtained as for lower qualities, and the heat is so thoroughly under the control of the attendant, that it is distributed at will, so that there need be no variation of quality, and there is also an entire absence of waste. The kiln is also more simple to operate than any ordinary type. The first cost, also, is less than any other of the same capacity. The wear and tear also is scarcely apparent, as the permanent walls merely serve as a cover or shell, and no intense heat is allowed to act upon them. The kiln can be built of any capacity and in various forms, to suit the space or requirements of the users.

There are at present a great many kinds of kilns put before you, with great claims, but we unhesitatingly challenge comparison in any one feature, first cost, through distribution of heat, the quantity of coal to burn per thousand bricks, wear and tear, simplicity of management, freedom from waste and the uniform quality of work turned out.

We are at present erecting a complete plant on our system for the manufacture of fire bricks embracing both machinery, kilns and appliances for a Pittsburg, Pa., firm. The method by which the work will be carried on is as follows: The clay as it comes from the mines, adjoining, will be served to the machinery in which it is ground, tempered and made into bricks which, as they are discharged from the machinery, will be loaded onto cars which will be run on tracks direct to the kiln. Opposite each entrance to the kiln is a turntable, and the operation of making and setting, burning and delivering will be one continuous daily routine. The plant, as it is at present being constructed, will be equal to a production of from 60 to 70,000 bricks per week, and will be operated by the following hands:

- 2 men charging raw material from the stock shed to the grinding mill.
- 3 boys at machinery.
- 1 boy to run the cars to the kiln.
- 1 man setting brick in kiln.
- 2 men burning.
- 2 men drawing and loading on cars.
- 1 engineer.

If you make a note of the hands given you will find what the cost will be per thousand bricks produced.

The same plant is equally adapted for producing silica bricks with the excep-

tion that silica bricks will require to be dried prior to going to the kiln. It may also be used for producing paving or the best New Jersey buff and building bricks.

We have tried to put before you as clearly as we could this new process, believing that you are sufficiently interested to give it your careful consideration. We court honest criticism and invite the closest and most minute examination, and we are glad to give every assistance in making clear the various details of it, and in enabling it to be thoroughly understood. There is absolutely no complication in the process, but it is as simple as could be devised. As will have been observed, there is a minimum of labor in connection with it; the work being practically all performed by the machinery and the closer the examination which you can give to it the more satisfaction you will obtain, and your verdict cannot fail to be favorable.

Written for the Clay-Worker.

HOLLOW WALLS AND THEIR EFFECTS. THEIR STRENGTH AND ECONOMY.

BY J. W. CRARY, JR.

AS I have had a good deal to say about hollow walls in and through the CLAY-WORKER, and as the question seems to be one of growing importance, as it really should be, I take pleasure in seeing that some writers in the CLAY-WORKER are trying to see if anything can be said against hollow walls. All questions have two sides, the *affirmative* and the *negative*. The negative is always good until the affirmative is proven. Let us put it sylogistically. All walls not exposed to heat are cooler in a warm atmosphere than the atmosphere itself, and will attract and condense the water in the air. Therefore, all walls are damp and wet.

A writer in the CLAY-WORKER of February, on "Hollow Walls," assumes the above false premises, and then gets the conclusion that hollow walls are wet. He says, in substance, that hollow walls are weaker than solid walls, and cannot be built without impairing the strength of the building. He says that he is not much of a brickmaker, but means that he knows all about brick laying, plastering, etc.

This writer's premises are false, therefore, if he will study logic a little, he

will see that his conclusions must be unfounded. I have no doubt of the good means, and good purposes, and I am glad he takes the negative in this question; it tends to proper inquiry into the importance of the subject.

My writing in the CLAY-WORKER shows how to build a hollow wall and make it dry and strong, and gives the theory and philosophy of the work. It will be found in my book on "Brick-making and Burning," and also in other articles of mine in the CLAY-WORKER, and what I have written is not on assumed premises hearsay, but from actual, well tried and repeated experiment. The walls of all brick houses should be built hollow. This can be done with economy, without impairing the strength of the wall in the slightest degree, and the advantages are at once apparent. 1. The inside *shell* of the wall is dry, and its temperature will change with the weather, so that it will not, to any hurtful extent, condense the humid air in a room. 2. It saves space and cost of "furring." 3. It prevents the burrowing of mice, rats and bugs. 4. It is permanent, and walls are not injured by the insertion of wooden blocks or strips in order to fasten the "furring."

Brickmakers and bricklayers should favor hollow walls. One of the chief objections to the building of brick dwelling houses is the cost over and above wooden dwellings. The plan of building walls hollow will save five per cent. in the cost of a common dwelling house, while it increases the capacity and permanency of the house.

In my next article I may give a diagram and full directions for the brick work of a dwelling house, and then I will be pleased to see any fault or criticism of my plan, if such criticism be founded on science and proved theory. What we want is more good brick buildings, more tile roofs and floors, buildings that will increase the value of real estate, lessen the burden of insurance, and add to the economy, comfort, health and civilization of our people.

Too much cannot be said (if well said) on this subject. The *tenement house* system, as practiced in New York and other big cities, is not only demoralizing, but is a disgrace to our civilization. It has already contaminated our politics, which has become *cancerous* in our large cities. We must check the soil, if it takes surgical practice to do it.

HINTS ON BRICKMAKING.

No. 61.

BY. R. BRICK.

If a stiff mud machine is selected, it will be safest to dry them under sheds, either on pallets or in hacks; if the latter they should be hacked in "cobb" or "pigeon" hacks. These sheds should be built substantially, so that they may serve to enclose the artificial dryer to be built in the coming autumn. This shed should be 150x50 feet, and covered with shingles or tin or other good material. The side posts should be eight feet in length; the roof can be double comb, with valley in center, supported by a row of posts in center parallel with side posts; or it can be single comb, and with purloin plates supported by two rows of posts dividing the building into three equal spaces. The posts ought to be at least twelve feet apart longitudinally, so as to occupy as little floor space as possible. The roof can be designed by any good builder, but must be strong and well braced, a strong girder should run across the building at each post, resting on the eve plate, also a heavy rafter, a brace not less than 2x8 should be let into the upright post four feet below the plate, pass upward at an angle of forty-five degrees, resting its middle against the girder, its upper end against the rafter, and well spiked to each of the three timbers. This will prevent the building from careening sidewise. It can be easily braced the other way by short braces from the upright posts to the plate, and by X braces on the middle rows of posts. This will dry a great many brick in summer and without loss from rain.

If at any time during the season the weather is unusually dry, it would be well enough to risk some bricks on the open yard, and if they should get "washed" a little with rain they would do very well for building permanent kilns or dryer.

We will now consider plans for a hot floor dryer. Just here I wish to refer to an article that appeared in a recent issue of the CLAY-WORKER, by an able technical writer, on the subject of heat generating and application by steam, instead of direct heat and contact by hot floors. The writer, in his reference to "flue dryers," says: "I have shown you above that a brick flue dryer conveys its heat in flues of thick non-conducting ma-

terial, that only radiate heat from the top side, and that are covered further with a thick layer of clay at one end to moderate the heat, *while the other end is usually cold*, and too slow if the dryer is anything like one hundred feet long, while the steam dryer conveys its heat in thin pipes of moderately good conducting material, which radiates its heat from every portion of its surface."

I will not enter into a discussion of this subject, but must notice this statement briefly. The above mentioned writer evidently never saw a flue dryer that was properly constructed. I have seen flue drying floors one hundred and fifty feet in length that were hot enough at the stack end to dry bricks set on end, one hundred bricks to each square yard of surface, in forty-eight hours.

Now a few words as to relative economy of generating and applying heat by steam and by flues. It is true, as stated, that steam pipes radiate heat from every part of their surface, and that hot floors only radiate from their top side, but in the latter, as the bricks are in direct contact with the hot surface, and are packed closely in it, there is no waste of heat, as the entire radiation is absorbed by the bricks and none is wasted until the bricks are dry their entire length, while with pipes the bricks are dried on cars in lots of 400 or 500. The radiated heat in rapid motion toward the draft stacks comes in contact and dries the bricks on the surface of the lot before those in the center are half dried. This is an indisputable fact. Then the greater per cent. of heat is coming in contact with bricks that are already dry, and is carried quickly by the draft into the stacks, without coming into contact with the damp bricks. So much for the application of the heat.

Now, let us look at the generating process. Steam is generated in boilers from twelve to thirty feet in length—average length perhaps eighteen feet—generating furnace at one end, smoke stack at the opposite end, heat from furnace comes in contact with the boiler while passing eighteen feet, then rushes into the smoke stack and out into space. In the flue dryer the heat is generated in furnaces in the same manner, and passes under the floor a distance of 150 feet before it enters the smoke stack, which seemeth most economical. As to clay being a non-conductor, that very fact makes it economical for this purpose. After it is once heated through it then furnishes the heat as fast as is

required and no faster, and being a non-conductor, it distributes the heat the entire length of the floor. Draft and degree of heat is regulated by dampers in the stack. Where capital is limited this is the only artificial dryer within the reach of the manufacturer. It is composed entirely of brick and clay, which is at hand. The only thing to buy is lumber for roof, and fire brick and castings for furnaces. The building already described will answer for a temporary dryer, through the first summer, then the flue dryer can be put in during the fall, and can be used in winter, so that we may sell all our brick in the fall, and then have a good supply ready for the early spring market. With a dryer more brick can be made in a year with one machine than it is possible to make by natural drying with two machines.

A complete description and instructions for building a flue dryer, that will dry brick thoroughly and economically, will be given in the April number of the CLAY-WORKER.

Written for the Clay-Worker.

THE OLD BRICK OVEN.

How oft have I heard
My grandmother tell,
Some wonderful tales
She remembers full well,
Of the dinners she cooked
At Christmas-tide,
In the old brick oven
By the fire-place side,
By Thanksgiving time
The hard winter's cold,
In rugged New England
Was a story quite old.
And the old brick oven
Was filled in a trice,
Was filled to o'er flowing
With every thing nice.

With a dainty plum pudding;
Baked beans in a pot,
Mince pies and baked apples,
All steaming and hot;
With chicken and turkey,
Was the old oven lined,
With white bread and brown,
And meats of each kind.

There were cranberry tarts,
And cakes by the score,
And pies made of pumpkin,
And many things more,
'Till she fancied she heard
The brick oven groan,
And wish that Thanksgiving
Had never been known.

This duty completed,
'Twas called on again
For the Holiday feasting,
Was next in the train;
And the family was gathered,
With friends far and near,
Who were bidden to come
And partake of good cheer.

And as it is often,
With memories old,
The past has a glimmer
More precious than gold,
My grandmother sighs,
With a look of regret,
And mourns for the loss
Of the brick oven yet.

—EMMA M. COX.

TUXPAM, MEXICO.

Editor Clay-Worker:

I have much pleasure in sending two photographs, with the following "brief descriptive matter," as requested.

Photo No. 1 is a view of a portion of a drying shed in my brickyard. "Very primitive" I expect some of your readers will think, but they must bear in mind that, although we have now got a little ahead of this (the picture was taken some time ago), we are still only in the experimental stage.

Photo No. 2 represents a Mexican who has brought a horse to see if I will buy him. I happened to have the kodak in my hand, and fired a shot at him from the up-stairs balcony of my house, from which I was talking to him. Horses of this class are worth about \$30 here. I bought the one in question for \$16. Picked animals for the saddle cost \$80 to \$100, and mules about 50 per cent. more than horses.

Several of your readers have asked me what kind of a place Tuxpam is. This view represents, perhaps, the most unpicturesque portion of the Tuxpam river, which winds its very circuitous way through unquestionably one of the most beautiful and richest valleys in the world, passing through, amongst other things, a large portion of the great oil belt of Mexico, which may some day play a not insignificant part in the world's supply of petroleum; also many valuable clay deposits, which, in connection with the oil, would seem to bespeak a kind of paradise for some future generation of brickmakers.

The river is navigable, with a depth of about forty feet, for about thirty miles, after which it is broken by an almost continuous succession of rapids, which, however, are not by any means impassable. Its width at the point shown is about six hundred yards, which width is carried down to its mouth, a distance of about nine miles.

This place is most certainly destined at some future time to become one of the principal seaports on the Eastern coast of the great American continent. A river forming a most magnificent

harbor; a bar which can be easily opened and kept open at comparatively small expense; shelters conveniently situated outside the bar, including Lobas Island, Tanguijo, Media and Tuxpam Reefs, behind which vessels, arriving in bad weather, can safely anchor in perfectly smooth water, during the highest gale, until able to enter the harbor; the only perfectly healthy place on the southern portion of the coast (yellow fever never comes here, though it rages every year at Vera Cruz and Tampico, with constant communication and no quarantine between the places); the nearest, easiest and in every way best point of communication on the coast with the City of Mexico and the principal centers in the interior, the projected lines passing through a country

is the front of the brickyard, the white patch being a flagged strip upon which the molding sand, which is brought up from the mouth of the river in "dug-out" canoes, is unloaded.

These dug-out canoes are the universal means of river transportation in Mexico. They are made out of the trunk of the cedar tree, and the size to which some of these trees attain can be judged from the fact that many of the canoes measure more than six feet in breadth and easily carry over fifteen tons burden, although they are not always made from one trunk, but often so.

As a proof of the fertility of the soil and quick growth of vegetation, I might state that the palm-nut tree in the foreground was planted when not a yard high, by me eight years ago, and has been constantly loaded with fruit for the last four years. I might also mention that the posts of the fence shown were cut for sleepers for the English railway between the City of Mexico and Vera Cruz, and have been in the ground as posts for about fifty years, and show every sign of being good for at least another like period. They are made from a tree called *Zapote*, which is certainly one of the most durable, as it is one of the most beautiful and valuable woods in the world. As a fuel it ranks ahead of oak, and almost equal to hickory. We have several woods here quite equal to hickory in



DRYING BRICK IN MEXICO.

exceedingly rich in timber, minerals and other products, and unsurpassed in fertility; also many other advantages too numerous to mention (to say nothing of the disadvantages), are some of the points which must some day command for Tuxpam the attention of the civilized world.

I fancy I hear some of your readers say, "The prospects of Tuxpam as a rival of New York in the far off future, when the New Zealander shall have concluded his contemplation of the ruins of London, are, no doubt, very interesting, even if somewhat visionary, but what has the picture got to do with brick-making?" Very little, I admit. The street along the river bank represents the "*Calle de Paseo*" (promenade) of Tuxpam. The portion inside the fence

heat producing qualities. The sap of the *Zapote* (which is also a most delicious fruit tree) is what the chewing gum, so largely used in the States, is made from.

These sleepers were at the time mentioned "a drug in the market," many thousands of them having been cut which could not be used by the railway company, owing to a little hitch which occurred in the wording of their contract. It appears the agreement was to build, on certain terms, a railway from the City of Mexico to Vera Cruz. The company naturally started in to make its grades and lay its rails from Vera Cruz, to transport its material, etc., as required along the line, but was politely informed that the agreement read "from the City of Mexico to Vera Cruz," and this position was firmly adhered to, with

the result that it cost the company very many times the amount to build the line, and delayed its completion for something like sixteen years. This is the case as stated to me, and generally understood here, the object having been to give more work and spend more money in the country, which object was undoubtedly achieved. I have never taken the trouble to investigate the truth of the statement (of which, however, I have no doubt) and give it to your readers for just what it is worth. It is one of the master-strokes of policy which have ever marked the Government of Mexico, and have helped to gain for her many proud distinctions; amongst others that of owing millions of dollars, on which she does not pretend to pay even the interest.

Let us hope that closer relations with her more enlightened sister republic will usher in a new era of progress and prosperity for this beautiful and most interesting country.

Please excuse brevity (?).

R. M. GREER.

Tuxpam, Mex., Feb. 13, 92.

P. S.—Since the publication in the CLAY-WORKER, of the letters I wrote you on the subject of roofing tile, I have had a great many inquiries about the French tile referred to in same. Some of my correspondents desire a sample of this tile sent to them. I have replied personally to all these inquiries, but would ask the privilege of saying through your columns, to any one desiring information in the subject, that there is a good deal of difficulty attached to sending packages of this kind from here, there being no express office. This, however, would not prevent my sending them if I considered it necessary; but, as stated in the paper you were good enough to read for me at the National Convention at Washington, Mr. Arnold has a sample of this identical tile, which I sent him to have my dies made from.

I would also draw the attention of your readers to the cut of a French roofing tile illustrated on page 411 of the November issue of the CLAY-WORKER, which (though I much prefer the other)

is practically the same, and as good a tile as anyone need wish for.

In making dies for this tile I would recommend, among other things, the avoidance, as far as possible, of all sharp angles and corners in the dies; they seem to give the tile an inclination to crack at that point.

With your permission I would like to take the opportunity of thanking Mr. Gibson for his answer to my inquiry regarding the Bordeaux tile, in a previous issue.

I think the subject of roofing tile is pretty nearly exhausted. The CLAY-WORKER has certainly done its share in the matter most thoroughly, and Mr. Gibson has well performed his part. It now rests with the individual members of the craft to decide whether they will

know that rotten wood is one of the worst things in the world to breed pestilence. The people are waking up and the cry for brick is the most we hear.

Of course, in the first place, a good quality of clay or shale is needed, and the next and most important thing to my mind is to burn them thoroughly.

My subject is, "Burning Paving Brick." I do not expect to say a great deal on this subject, but to tell what I know in as few words as possible. I do not believe in lengthy papers, nor in long winded sermons, but I do believe in taking plenty of time for burning paving brick.

In attending these conventions I have heard my worthy brick brethren tell of burning in so many hours, or three or four days, and I have gone home dissatisfied with myself and my slow way, and have tried to rush my kilns through in a shorter space of time, but have always found it a failure. I have come to the conclusion there is no such thing as burning a first-class vitrified street paving brick from our clay short of from eight to ten days. In the first place it is quite necessary to have the right kind of a kiln to burn with. For a vitrified brick the kiln should not be too high nor too wide, and I do not think you can burn successfully with an up or down-draft kiln alone. It is necessary to have an up and down draft combined to get from eighty to ninety-five per

cent. of good hard top brick. I do not think it advisable to set them more than thirty brick high, as too much weight is apt to press them out of shape.

We know that clays vary a great deal, but I claim that lots of time be taken in water smoking, and then heat up slowly till you get it to the right pitch, and then keep it there. When the kiln has begun to settle it is very necessary that it should not be allowed to stop. For the first two days we do not let it settle more than one inch every twelve hours; after that the kiln is well heated through and settles faster. We call fifteen inches a good settle for our clay. After you find your kiln has a good settle and you think there is not a soft brick in it, burn it twenty-four hours



A MEXICAN LANDSCAPE.

take the matter up practically or not. *"There is a tide in the affairs of men, Which, taken at the flood, leads on to fortune."*

BURNING PAVING BRICK.

*BY H. DAWSON, SR., SPRINGFIELD, ILL.

The street paving brick question is being agitated a great deal here in Springfield, as I suppose it has been in all other enterprising cities. But here in our city the people are thoroughly sick and tired of block pavement. They have become in less than eight years a mass of spongy, rotten matter, which is really not safe for travel, and will in time, perhaps not later than this spring, cause an epidemic of sickness, for we all

*Paper read before the Illinois Brick and Tile Association, Springfield, Ill.

longer. Of course I do not mean that exactly, but you can do more harm by closing a kiln too soon than by running it too long.

I am a brick man, and expect to make my living at that business as long as I live, and the more brick I sell the better I like it, but I do not want anything put into our streets and roads other than a good tough, well vitrified brick that will last from fifty to one hundred years on an ordinarily traveled road, without any repairing.

Written for the Clay-Worker.

ENAMELING BRICK.

No. 9.

HAVING fully described the method of setting enameled bricks in my last letter, in a way that I hope will be of practical value to your readers, I will now give my reasons for setting in this way, which are none the less practical, and should be well understood, as it has an important bearing on the quality of the bricks. The facts are these: Glazed surfaces reflect and absorb heat in exactly the same ratio, so that when the bricks are set face to face the reflection and absorption of heat are equal, the reflection and refraction of light are equal; and the results produced are brilliancy, smoothness and evenness of color. All of these qualities or characteristics are of prime importance in an enameled brick. It will, I think, be well to give the results if set some other way. Supposing the bricks are set back to face, you will find that the glaze face is rough, dull and a dry ashey appearance, and stained with the color of the other brick, and will, therefore, be quite worthless as a representative of what it was intended to be. The reason for this is to be found in the fact that the reflection and absorption of heat is unequal. The rough surface takes all and gives nothing back, and the results are as above stated. There is an unalterable principle in this which holds good in the manufacture of all and every class of glazed goods, no matter what the glaze may be, whether it be what is understood to be a salt glaze (which it is not) on sanitary goods, or a glaze for tiles, fine or coarse earthenware, and enameled bricks, this principle is unalterably involved in it, and will appear for good or ill in proportion to the knowledge or ignorance of the person dealing with it.

Again, this is seen in setting colored bricks. Light colors have a greater

attraction than dark colors. Thus it will be seen that each color must have its own place in the kiln, and must not be mixed with other colors. If you take stone color, drab, orange, yellow, buff and other light colors and set them opposite to black or blue of any shade, they will be stained with the darker colors, and, therefore, will not be perfect. I think I need not say any more on this part of our subject, but turn our attention to the burning question, and, first, I will state my own opinion, which is, that a good, steady, practical burner is the backbone of any works manufacturing goods from clay, no matter what kind or class of goods they may be, and a few shillings per week in his wages is more than compensated for in the quality of the goods he will turn out. I am aware that there is one other thing which is quite essential to good burning; that is, proper kilns in which to burn the goods. These two things are absolutely necessary to the production of high class goods, though I venture to think from what I read in your journal that this statement will not be admitted in its entirety, as some say that, if you only have the proper kiln, it will not matter at all about the burner. Others say, if you have a good burner, it does not matter what sort or kind of kiln you have, and I am ready to admit that some of the achievements on both sides are regular eye-openers and makes one feel to be only a novice at the end of a life time. But I venture to affirm that there is but one sound principle, and this principle in the burning of all and every class of clay goods, from the commonest brick to the finest china and porcelain, and is in the most special sense the prime factor in the production of all glazed goods. Not only is this so, but this principle is applicable in every country. The air we breathe is made up of the same constituents the world over, and this should be brought into subjection and control under the hand of the burner, and with a view to this, kilns should be constructed to take all the air that is necessary to the complete combustion of the fuel and sufficient to carry off most completely all the sulphur that passes into the kiln as the fuel is consumed.

This is the first part, and if this is done there will be some chance for the kiln of the burner to take effect in procuring goods that commend themselves to the buyer, and will be satisfactory and creditable all round.

Well, what are the characteristics that distinguish a good burner. The answer may be given in a few words. He must be able to control the element above named. How is he to do this? Well, some one says that is an easy matter. If there is too much draft push the damper in, and I cannot see that it requires much skill to do that. Granted, but if you check the draft with the damper, you bear this in mind that you will, in the same proportion, stop back every thing else that is injurious to the bricks, and therefore however this may appear in theory, it is wrong in practice and should never be resorted to. It is the wrong end of the kiln to deal with this matter, and I never allow a damper to be used in any kiln of mine at any period of the firing. It is the air that carries the heat to every part of the kiln and its inrush, if properly regulated, must be so regulated by the burner at the fire holes and not at the stack, and this is the point at which the skill of the fireman comes in, and it is here that the goods are made or marred. The question is, have you got men of this stamp. If you have you are better off than we are in this country in which bricks have been made for ages past, for there is not one brick man in five hundred that can burn a kiln of brick, if they have any principle on which they act, it is this, that it was in the beginning, is now, and ever shall be. The old fad says, get your kiln up to a good heat, then soak it down for thirty or forty hours, and you are all right. Now some of your brickmakers vary this a little. They say, water smoke your kiln and then get it up to a white heat, and hold it there for forty hours and then close it down. This is something like saying to a man going up one of those mountains, "here, you must go up one-third of the way very quietly, then you must increase your speed another third, then you must sit down forty hours, and you will be at the top." It reminds me of a man I worked for when a boy. When he had filled the kiln he would shake the dust out of his apron and say, "There, they are right till they are drawn." Hope was strong, but the certainty that they would be right was a diminishing number, and when I read in your journal that bricks are sold at the low price of two dollars per thousand, it leads me to the conclusion that much of the brick burning in your country is done on the same lines. But this kind of burning will not do for en-

ameled bricks. My own ideas of burning bricks and all other goods are that, from the first moment when the fire is put to the kiln, to the last moment when it is put out, the temperature must be gradually raised, and the burner, to be worth the name, must be able to control this action.

Perhaps, in concluding these letters, it will be thought that I ought to say a word about the enamel. I have, in a former letter, given a list of materials from which all enamels are made, including my own, but I suppose the combination of those materials to form the enamel will be latin to your readers, and if I had given in this letter the exact recipe for the best enamel I know of, it would have served no good purpose, for it might have failed in the majority of cases, and thereby have brought me into discredit. As a case in point, I have had an application from a gentleman in America to send enamel ready for use to be tried on his clay. This course I objected to, for reasons fully set forth in these letters, and which may fully proved when I received his clay here, as I had to make several alterations in the enamel before I could make it fasten to the clay. So you will see that to do this is quite misleading, and, as I have said before, in the majority of cases the results would be failure and dissatisfaction, but I am wishful that the information contained in these letters should bear fruit, and that any firm wishing to pursue the matter further should realize all the benefits that I am quite sure is contained in it. Therefore, I am willing to try any clay

of conclusion I think I may be allowed to say, I have put the matter in the plainest possible way. I have not used terms and phrases that cannot be understood by the most ordinary understanding, and I have not laid down any formula that I cannot myself explain.

What I have written is the results of my own personal research, investigation and experience, covering a good few years. I have pointed out the rocks and shales, and the channels to be avoided, whilst the path to success is put before your readers as plain as written matter can put it, and I hope I may have contributed something that will tend to the enlargement of the views and ideas of enameled brick manufacturers, and though your readers will not jump into enameled brickmaking just as they might jump into their grandfather's boots, yet my opinion is that any man laying claim to a fair amount of intelligence in brickmaking, with the information contained in these letters, with that which is within his reach, should be able, after a very short time, to make enameled bricks.

MANAGER.

ECONOMY IN BRICKWORK.

ON the last day of the session of the late Convention at Washington, there was drawn from the Question Box, a "suggestion" which, briefly stated, was the demand for an 8x8-inch pressed brick, to be used as a header, or binder, tying the front (or pressed) brick securely to the backing without marring the beauty of the wall, and at the same

the brick a place to insert one end of the strip, which should be bent at right angles with the part that extends across, and over the next adjoining course of common brick.

The trouble with the metallic binder is, the mason so often *forgets* (?) to use them. The writer knows of instances where fronts have gone up the first story before the binders were *thought* of, although they had been specified by the Architect to be placed in every fifth course.

In other cases, which have come under his observation, not fifty per cent. of the number of binders were used, which should have been used to make a good and substantial job.

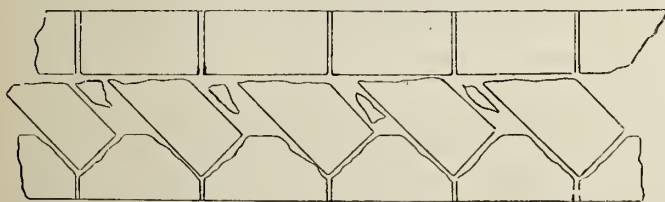
The system of clipping is good in its way but first, taking into consideration the time it takes to clip the pressed brick, which according to lowest estimate is 5 per cent.

Second,—the loss by breakage in the effort to clip, which is another 5 per cent. of the cost of the Pressed Brick.

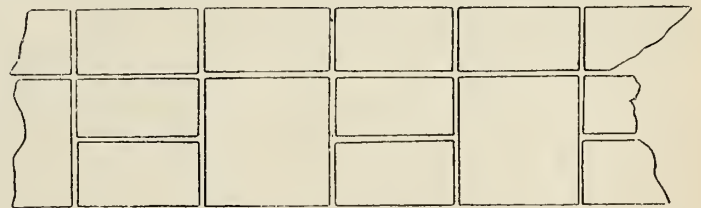
Third,—the clipping of the common brick binder which is another 5 per cent. of the labor of backing up—we have quite a margin to induce the use of the 8½x8½ brick, to say nothing of the strength added to the walls by using a solid binder.

The effectiveness of this brick is being recognized by our best Architects and we now often see specifications in offices calling for this "binder" where two years ago any one suggesting its use was treated as a novice, and his ideas on the subject, not worthy of consideration.

The Hydraulic Press Brick Co., of St



Old Style.



New Style.

that may be sent to me, carriage fully paid, and having definitely determined what is suitable in each case, to return samples to the sender free of all cost or charge. After this I will send a sample of enamel ready for use for a small charge to cover expenses, to be followed by the recipes to make white and all colors of enameled bricks with working—drawing of a kiln to burn them in by arrangement. The editor has my address, and now, Mr. Editor, for all practical purposes my task is done. By way

time, increasing its strength and solidity.

The "Suggestor" does not seem aware that the trouble "that all pressed brick fronts crack, and shift away from the common brick" might be obviated, by "clipping," as illustrated in the "old style," of the accompanying cut, or by the use of metallic binders, which, in a measure answer the same purpose and when properly used, are effective—provided, of course, that the metal strip is shaped properly, and there is made in

Louis, were the pioneers in this line, as in many others, and brought it to the notice of the trade in their catalogue of 1888. It rested there for *some time*, but awoke from its lethargy and is now indestructibly represented in buildings in Chicago, New Orleans, St. Louis, Seattle and intermediate points. Its use is also shown in accompanying cut as "New Style" and needs no comment.

It is known by the Hydraulic Co. as No. 223 or the Flemish Bond Brick, and is sold for about twice the price

of a regular Standard Pressed Brick.

The above information will probably reach "suggessor" and all interested, provided you deem it important enough for publication. "NOVICE."

THE SERGEANT BLUFF AND SIOUX CITY BRICK COMPANY'S WORKS.

THE Sergeant Bluff & Sioux City Brick Company's Works are situated on the C. & N. W. R. R., seven miles from Sioux City, Iowa, and the factory is connected with the main line of the railroad by 2,750 feet of switches, one running south of the kilns, one north of kilns, and one to the boiler rooms for coal purposes. This makes a very desirable system, as the kilns can be

fourteen feet above them. Here the clay is thrown down on a platform and from thence shoveled into the dry pans by four men, two to each pan. After the clay is crushed, it is conveyed to the floor above by an endless cup elevator to the pug mill, and from there down again into the brick machine, which is a Penfield No. 20 plunge machine, capacity 60 to 80,000 per day. From the machine, the green brick are placed in cars, nine high, each car, holding 500 brick, and run into the steam dry house. Each car with the brick still upon it remains in the dry house 36 to 48 hours, and are then trammed on moveable tracks direct to the kilns.

The whole plant covers a wonderfully small space, being very compact, and

and is as different as possible from a brick "yard" in the ordinary acceptance of the term. The factory was planned and erected under the superintendence of Mr. Geo. H. Brown, who is the present manager. Mr. Brown is young in the "craft" but is no "silk stocking" manager; can be found any day at the factory with his working clothes on, takes great pride in his works, and is a progressive man, determined to improve his product whenever possible.

Written for the Clay-Worker.

THE FUEL QUESTION.

No. 17.

DEAR WILL: Atmospheric pressure, and its effects on fuel, did not receive the consideration I intended in my last letter. I will, there-



WORKS OF THE SIOUX CITY (IA.) BRICK CO.

emptied from either end and loaded directly upon the cars for shipment. The kiln plant consists of five Eudaly down draft kilns, and one, Radford Continuous kiln, the former holding 220,000 brick each, and the latter having 14 chambers of a combined capacity of 336,000, the kiln turning out a chamber every week day, or 24,000 per day.

The Radford kiln is used for common brick only, and the Eudaly kilns for paving brick.

The bank is of blue wedge clay or shale, 40 feet high above the yard level, and 100 feet below, so the supply is practically inexhaustible. The material is excavated with a Barnhart steam shovel, thrown into cars of 2½ yards capacity, and hauled up an inclined track with a wire rope attached to a steam drum, into the machine house opposite the two dry pans, and about

yet arranged so that the product is handled with a minimum of hand labor. The capacity of the factory is 40,000 pavers and 24,000 common brick each day, most of the labor being on the task system.

The pavers are of particular toughness and density, the strain required to produce fracture being 180,000 pounds, and the absorption practically nothing.

The market is a home one, Souix City, now under contract for paving, which will take 4,000,000, and further lettings will be made in the spring. This is one of the cities which has had an extended experience with wood blocks, but if another contract of the kind were proposed, there would be a popular uprising against such a waste of the tax-payers money.

This plant is *par excellence* a brick factory, can be run 300 days in the year,

fore, briefly refer to it again, and then pass on to the consideration of slow and rapid combustion, which may have its extremes fixed, one with the rusting or oxidizing of metals, and the other with the combustion of explosive mixtures.

The height of the barometric column always balances the height of a proportionate atmospheric column, due allowance being made for temperature. In former letters I have shown you that air expands one-four hundred and ninthieth for each degree Fahrenheit that it is heated, and conversely it contracts in the same ratio for each degree that it is cooled. Cooling and pressure produce the same results on air and gases generally. Atmospheric pressure varies in this section of the country to the extent of about one pound per square inch, or from fourteen to fifteen pounds per square inch. You will

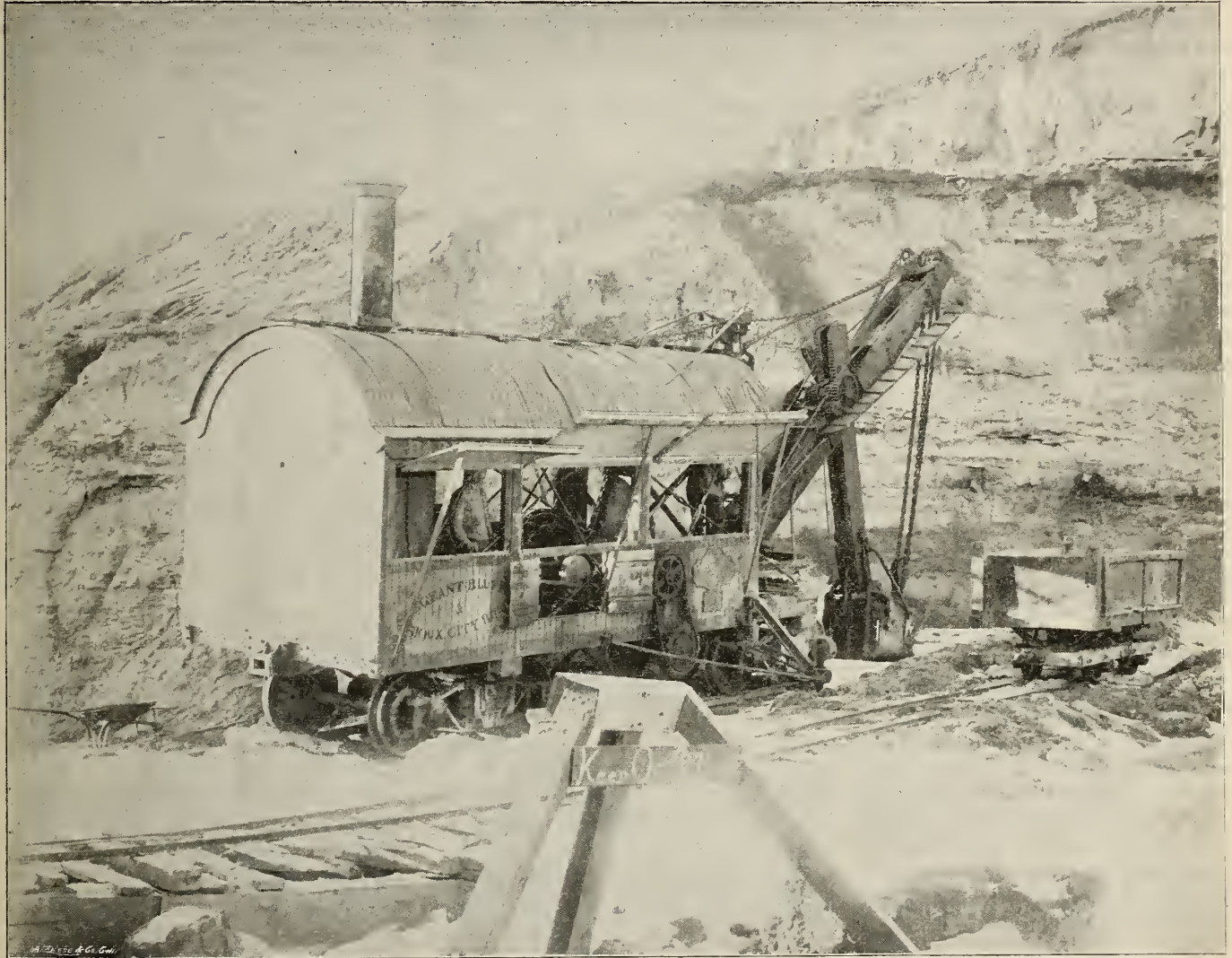
easily perceive that compressed air contains more oxygen than uncompressed, and will therefore oxidize or consume more fuel, and from what has been said before you will understand the difference of atmospheric pressure at different attitudes above sea level, thus when the barometer stands at thirty inches at sea level it would stand at about twenty-nine inches if elevated 1,000 feet, the conditions remaining the same, and as the air becomes rarified as we ascend, considerably more than 1,000

feet, we should have the mercury at about $1\frac{1}{2}$ inches and the density of air one-sixteenth of sea level density, here we should require 4,000 to 4,800 feet of air to burn one pound of coal. This is, of course, an inaccessible height, for, even if such an atmosphere would sustain life, pure oxygen would sink in such rarified air, for at this elevation air is lighter than hydrogen. From what has been said above, you will see that one-half of the atmosphere lies below the 18,000 feet line. If the density of

PRESSURE OF THE ATMOSPHERE AT DIFFERENT LEVELS.

Height above the sea in miles.	Height of Barometer in inches.	Density of air, sea level=1.	Pressure in lbs to sq. in.
0.	30.	1	15.
3.4	15.	$\frac{1}{2}$	7.5
6.8	7.5	$\frac{1}{4}$	3.75
10.2	3.75	$\frac{1}{8}$	1.875
13.6	1.87	$\frac{1}{16}$	.9375
.....			
51.0	.0009	1-32768	.0004

The extreme heights and densities given above are, of course, out of



AT THE CLAY BANK—ST. LOUIS CITY BRICK WORKS.

feet will be required for the next inch of fall in the mercury, and so the distance above sea level keeps on augmenting until, at the height of about 18,000 feet, the column of mercury is only fifteen inches high, and the density of the air is only one half; at this height then, instead of 250 to 300 feet of air to burn one bushel of coal, we should require 500 to 600 cubic feet to do it, and at four times this height, or 72,000

the atmosphere were the same above as at sea level, its limit, instead of being fifty miles, would only be about 5.2 miles high. The following table I copied from "Natural Philosophy", by S. A. Norton, A. M., a book I think you would be much interested in. It is elementary, well written and nicely illustrated. The table is prepared to show the decrease in density of the atmosphere as the height increases.

question when we come down to the fuel question. Seven miles is a very perilous height for experienced aeronauts. There are, however, some intelligent brick manufacturers out in Colorado who might give us some information as to how atmosphere pressure effects them in their burning, etc. Some of them were formerly Eastern brickmakers and burners, and are now 10,000 feet above their former level, drying and

burning bricks with an atmosphere of only three-fourths of the density they were accustomed to down East, and they must—according to the natural laws—use one-fourth more *volume* of air for the complete combustion of a given weight of coal. This, however, is easily overcome in several ways, increasing the draft being the simplest. Trusting to the kindness of some of the Colorado brethren for their practical observations on this subject, I refrain at present from further theorizing on it, and will now pass on to

SLOW COMBUSTION.

Some of the phases of combustion are not known as such by the majority of mankind, so accustomed are we all to see energetic combustion, accompanied by high temperature, appealing to our senses of sight and feeling, that we neglect the slower, undemonstrative manifestations. For instance, we look on the rusting of iron or steel with perfect indifference as far as combustion is concerned, and, moreover, I know a great many who are very slow to admit that heat is generated thereby, none of them question the genuineness of the combustion of iron wire in oxygen. This appeals to their senses, but they object when rusting is pronounced identical in every respect except the speed; they *feel* no heat and *see* no light, and consequently reject the theory as untenable. It is quite as unreasonable to deny movement to the hour hand of a watch or any other slow movement undiscernable to the sight. To rely on the sense of feeling in the examination of temperature is one of the most misleading things an enquirer can do. I have in previous letters pointed out this fact, but will again dwell on it for a short time, because there is such a tendency to trust to the evidence of the senses, and in a great measure to ignore the knowledge that lies beyond them.

I shall only give you two experiments which you must try for yourself, nay, I think you have tried one of them scores of times, and so has everybody I think.

Ex. 1. Walk into a cold room that is carpeted and that has a bare hearthstone. You must walk in with warm, bare feet; you experience little inconvenience while you are on the carpet, but step on the hearthstone and you immediately experience a great change which your *sense of feeling* plainly informs you is a change of temperature; if you now test the temperature of the carpet and hearthstone you will find

them practically the same. The thermometer in this instance and the following overthrows the evidence of the sense of feeling or of touch.

Ex. 2. Take a basin of hot water that you can just bear your hand in; take another basin of snow into which mix a little salt; have two other basins ready, with cold water in each, of the same temperature; now dabble in the hot water with one hand and in the snow and salt with the other for a minute or two, then immerse each hand in the basins containing cold water, and what does your sense of feeling inform you? It informs you that one basin contains warm water and the other contains very cold.

I cannot do better than give you an extract or two from Prof. Tyndall's Six Lectures on Light: "The human mind however, is so constituted and so educated as regards natural things that it can never rest satisfied with this outward view of them. Brightness and freshness take possession of the mind when it is crossed by the light of principles, which show the facts of Nature to be organically connected. * * *

In doing this we shall learn that the life of the experimental philosopher is twofold. He lives in his vocation a life of the senses, using his hand, eyes, and ears in his experiments, but such a question as that now before us carries him beyond the margin of the senses. *

* * * To realize this subsensible world, if I may use the term, the mind must possess a certain pictorial power.

It has to visualize the invisible. It must be able to form definite images of the things which that subsensible world contains. * * *

If the picture be correct the phenomena are accounted for. A physical theory has been enunciated which unites and explains all.

This conception of physical theory implies, as you perceive, the exercise of the imagination. Do not be afraid of this word, which seems to render so many respectable people, both in the ranks of science and out of them, uncomfortable. Without imagination we cannot take a step beyond the bourne of the mere animal world, perhaps not even to the edge of this. But in speaking thus of imagination, I do not mean a riotous power which deals capriciously with facts, but a well ordered and disciplined power, whose sole function it is to form conceptions which the intellect imperatively demands. Imagination

thus exercised never really severs itself from the world of fact."

I have been prompted to this digression by a consciousness of your preference for the exceedingly practical side, and your tendency to ignore the theoretical side, and to put yourself under the guidance of what is known as "good practical horse sense," which is all very well just so far, but let me remind you that your course is very limited, indeed, if you despise the assistance of theory.

Now, to return to slow combustion, and we will commence with *very slow* combustion, the oxidation of some of the metals, the rusting of iron, for instance. I think I have told you before that there is precisely the same quantity of heat generated by the formation of an ounce on a bundle of wire exposed to the weather, as there is by burning iron wire in oxygen gas until an ounce of oxide is formed. The sense of feeling can at no time discover any heat generated by this rusting, nevertheless it is there, and if it could be accumulated in the wire instead of being dispersed as fast as it is generated, it would certainly get the bundle red hot, and be evident to both the senses of sight and feeling. If you think over it a little you will soon see why no *sensible heat* is generated. Think of the time it will take to accumulate an ounce of rust on a bundle of wire, say one pound in weight. The burning of the other wire in oxygen gas occupied one minute of time, and generated, perhaps, 100 units of heat. The rusting wire takes a year and a half or two years to generate these 100 units of heat, these strung out over a period of two years sufficiently accounts, I think, for it being insensible heat. There are many other forms of slow combustion which would occupy several letters to merely enumerate them. The oxidizing of the metals, the decay of vegetable and animal matter, the burning of all kinds of fuel are all on the same principle, and heat is given out in each and every instance of such decay or oxidation. In some cases of slow combustion heat accumulates and becomes quite sensible; for example, in a barnyard, manure heaps; again an accumulation of oily waste; and in a cargo of coals in the hold of a vessel or large stock stored on land.

As a contrast to the slow combustion of iron, let us take the oxidation or burning of sodium and potassium; these, I need not tell you, are not slow oxidizers. On the contrary, they oxidize

very quickly and take fire spontaneously when floating in water. Immerse them in a liquid free from oxygen and they are safe from combustion.

Many of the metals oxidize much slower than iron; for example, tin, lead, zinc and copper, while gold, silver and platinum are positively difficult to oxidize.

We will now turn our attention to quick combustion, passing the medium rates, which have been dealt with in previous letters, and to which I must refer you.

Yours Paternally,

HYDRO-CARBON.

(TO BE CONTINUED.)

THE MANUFACTURE OF DRY CLAY PRESS BRICK.

THE subject assigned to me "The Manufacture of Dry Press Brick" is one with which many, perhaps all, of you are familiar. A brief description of the process however is not out of place.

The process is pressing dry or semi-dry clay into perfect bricks; solid and ready for the kiln, instead of using water, pugging the clay, drying the bricks, etc., in the old way to accomplish the same results.

A few years ago in many localities among old brickmakers a prejudice existed against brick made by the dry clay process. It was asserted that bricks made in this manner would not stand the test of time. Even going so far as to pronounce them worthless.

Within my experience upon exhibiting some of the best bricks made by the dry clay process I have been flatly contradicted by brickmakers of the old school who asserted that they knew beyond question that no such bricks could be made without the use of water and a repress. They were, in my opinion, candid in their belief, but now a days one rarely meets with a brick manufacturer that is entirely ignorant upon this subject.

The prejudice existing some years ago was not without reason.

At that time at points remote from the large cities, attempts were made to manufacture such bricks by use of light and inferior machinery incapable of sufficient pressure. The clay was not properly pulverized and in many cases the bricks were not properly burnt.

Of course, the man who purchased the machinery supposed, when he had purchased, that his fortune was made. He expected to be far ahead of his

brothers who stuck to the old process, and he pronounced the half burned shaky specimen produced a brick, and insisted that it was good enough.

I do not wonder that some honest brickmaker who was selling good bricks made by the old process denounced both him and his process. He would be serving both his patrons and himself a good turn by doing so.

Now, however, with the right quality of clay, proper machinery and correct burning, bricks are produced by this process for building purposes that cannot be excelled for beauty and durability. This is evidenced by the massive buildings erected at all the large business centers. Notably, those of great height in the World's Fair City where they are specified by Architects, not only for their beauty but because of their durability and strength in resisting the enormous crushing weight sustained in buildings of such towering height.

The methods of fitting up for the manufacture of dry clay brick vary.

I don't know as I can better explain the process than to give a description of a new and modern plant for the production of the finer grades of such brick that I recently had the pleasure of visiting. The proprietor after years of experience in the dry clay brickmaking at St. Louis decided upon a new plant and it has been in operation the past season.

He remarked: "I have worked for years at a disadvantage at my old works, and in my new works I intend to have all modern appliances, and hope to make the works second to none in this country."

He purchased about 80 acres of fine clay land, apparently inexhaustable, near the railroad about 15 miles from St. Louis. Underlying the land is obtained a good quality of coal, at a cost of 50 cents per ton, delivered at the kilns. Facing the railroad are eight covered kilns of one hundred and fifty thousand capacity each. The kilns are all connected with pipes in order to dry and water smoke the brick by utilizing the waste heat from one kiln to another. A tram way runs from the coal mine on an incline, and his coal is delivered from the mine to the kilns with no expense for transportation except the services of a boy to ride down with the car and set the brake when it arrives at destination.

A railroad side track extends the

length of his kilns and bricks can be loaded on cars from kiln. Across from the kilns is a substantial three story brick building. This is his engine house and machine room, where the clay is pulverized and made into brick, in fact, it is as he terms it, a "brick factory," not a "brick yard."

At both ends of this factory extend commodious clay sheds. The ground contiguous slopes towards these sheds, and the clay on these slopes is first cut into small furrows with a disc harrow, then allowed time to dry. When properly dried or cured, it is scraped under the sheds with a drum excavator operated by one man and a span of horses.

This drum excavator is self loading, and started at the top of the slope will take an even cut from top of slope to bottom, loading itself with about a yard of clay when it reaches the bottom of slope, which is dumped from the machine with the facility of an ordinary dump-cart.

The clay thus accumulated is not from one section of clay land as it would be if it was shoveled on a cart, but is a fair sample of all of it from top to bottom of slope. Hence brick made from clay accumulated in this manner should be uniform in color and texture.

The saving by this method of gathering clay is considerable. It would require several laborers with shovels, with man and team added to accomplish the same results, and then your clay would not be taken from clear across your slope.

The harvested clay is allowed to remain undisturbed under shed until a sufficient time has elapsed, to have it undergo the sweating process, thus evening the temperature throughout and obviating a streak of dry and a streak of moist clay appearing in the brick.

When the clay under cover is properly cured it is conveyed by a screw conveyor to the pulverizers.

At these works rollers are used of differential speed for the first process. The clay after passing through these rollers is elevated by bucket elevators to the top of the factory, and passes into the disintegrators. The disintegrators used there consist of a funnel shaped perforated steel jacket with steel wire brushes revolving perpendicularly at a high rate of speed inside this jacket.

[CONTINUED ON PAGE 353.]

ANOTHER IMPROVEMENT.

The New Anderson Brick Machine.

THE accompanying engraving is an accurate representation of an improved soft-clay brick machine now being manufactured by the Anderson Foundry & Machine Works of Anderson, Ind., a firm well and favorably known to American brick-makers as the manufacturers of the Chief Brick Machine, a machine that for years has been regarded as one of the best of its class. The New Anderson is an improvement upon it, and is believed to be the perfection of mechanism for the production of first-class brick from any clay that can be worked by hand or any similar process.

DESCRIPTION.

METHOD OF CONSTRUCTION AND OPERATION OF THE NEW ANDERSON.

The pugging cylinder of this machine is 42 inches in diameter and 52 inches high, made of heavy boiler plates. The main or pugging shaft, which is of steel $3\frac{1}{2}$ inches in diameter, is provided with ten sets of steel knives, which make one complete revolution for each mold of six bricks each, which gives the machine from two to four times the pugging capacity of other machines, and enables it to work any ordinary clay direct from the bank without the additional use of a pug mill. The lower end of the pugging shaft is provided with two powerful wipers, which, even without the assistance of the weight of the great volume of clay above, would be sufficient to force the clay out of the lower end of the pugging cylinder through an oblong opening into the press chamber, and under the vertical plunge in such a manner that when the plunger descends upon it the opening in the pugging cylinder through which the clay has been forced by the wipers, is closed up, thus preventing the clay from being forced backward and upward into the pugging cylinder again. This being accomplished, the filling of the molds is no longer a question, but an absolute certainty; the result is that every mold pushed out contains six perfect bricks, with square, sharp corners, regardless of

how stiff or stubborn the clay may be.

Such results as the above mentioned can not be expected from the use of any of the horizontal machines, in which the die and press chamber are on a level with the ineffective pugging apparatus, and have no way of confining the clay, but must depend upon it being soft or fluid enough to flow through the die without any great amount of resistance.

To provide against damage to the machine, in event there would be too much clay, or an obstruction of any kind get into the pressing chamber, the cross-head of the plunge is provided with an auto-

ceives an equal amount of pressure. The length of the stroke of the plunge is easily regulated by a graduated slide within easy reach of the capper. If it is desired to run the pugging shaft independently when first starting the machine, for the purpose of filling the cylinder or pugging the clay, the movement of the plunge can be arrested by removing a pin secured to the upper end of the same by a small chain. The table upon which the molds are delivered is supported by two lock eccentrics placed upon a heavy steel shaft underneath it, and can be lowered by throwing back the lever "L" if it is desired to take out a mold,

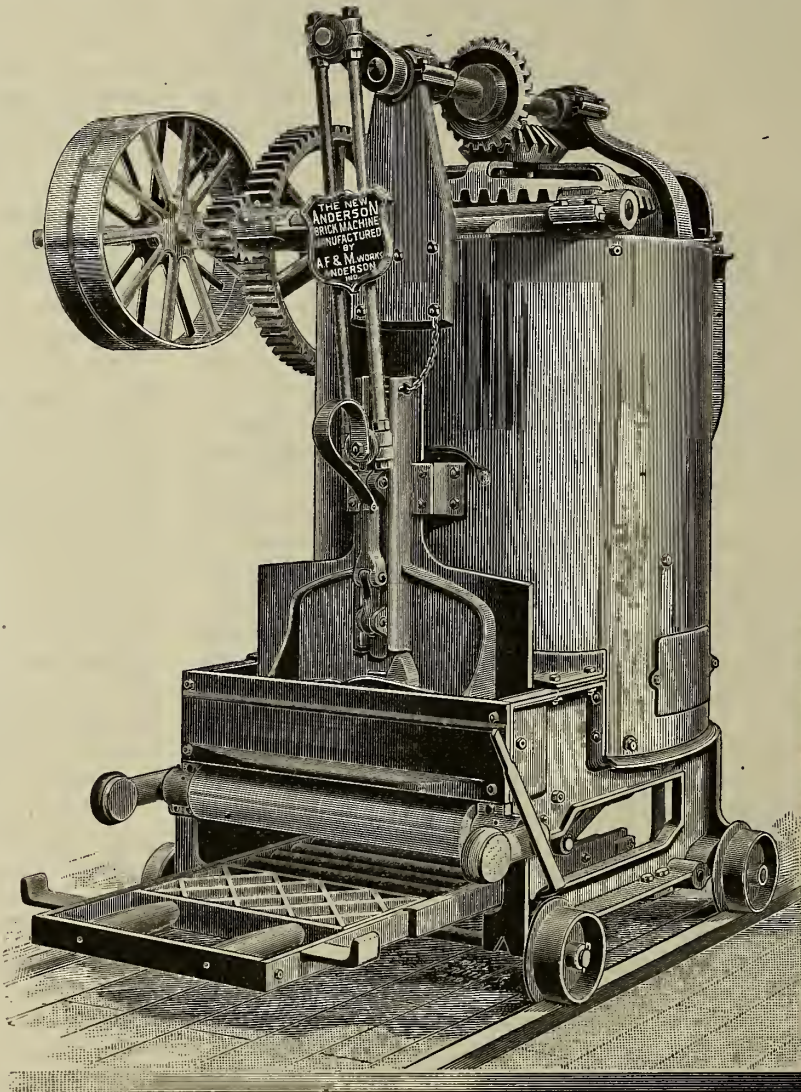
when machine is not in motion. The mold push, which is very strong and simple in construction, is fixed at rear of base and so arranged that the molds are carried forward with steady motion, and the return or backward movement of the push is quick, which gives the mold sander ample time to get another mold in position, before it starts forward again. It is also provided with an automatic relief device, which is a safeguard against the breaking of molds, should they become caught or jammed.

THE NEW ANDERSON NOT AN EXPERIMENT,

But a demonstrated success. It is constructed upon thoroughly scientific principles, based upon a practical experience of many years in the manufacture of clay-working machinery.

Before placing the NEW ANDERSON on the market the manufacturers, in order to demonstrate its good qualities, placed a number of them on different yards, where they were tested most thoroughly and impartially, and at the end of an entire season's trial their excellent work, strength and durability,

exceeded the most sanguine expectations. The capacity of the NEW ANDERSON is limited only by the facilities for taking care of the product. It is so perfectly constructed mechanically that the amount of power required to operate it has been reduced to the minimum. To operate the brick machine alone but from six to eight horse-power is required, according to the nature of the clay used. The manufacturers also make other brick and tile machinery and a full line of brickyard supplies, as may be seen by turning to their ads. on pages 384-393. Readers of the CLAY-WORKER are urgently requested to write to the Anderson Foundry and Machine Works, Anderson, Ind., for catalogue and prices. Mention this paper.



THE NEW ANDERSON BRICK MACHINE.

matic safety, or relief device, which has a wide range of adjustment, by means of one set screw, at all times easy of access.

The front of the pressing chamber is also provided with a safety or stone door which allows stones that may get into the die to be carried out by the molds without doing them damage. This door can also be thrown open instantly at any time for the purpose of removing grass, roots or any other obstruction that get into the chamber and obstruct the die.

The pressure upon the clay when filling the molds is direct, and each brick re-

The clay comes from this disintegrator whipped very fine. If it had been flaked in passing through the rollers the steel wire brushes have thoroughly disintegrated the flakes, still there may be shotty lumps that would show on the face of the bricks if not removed. Great pressure will not prevent these lumps from showing, and while the bricks may be just as durable their beauty would be marred if the face was not free from a visible defect, and we are attempting to make perfect pressed brick.

To obviate this a wire screen set at proper angle receives the clay from the disintegrator. Beneath the screen is a wooden spout which receives the clay that is sufficiently fine. The spout empties into the mixer, the tailings or coarse clay being re-conveyed by another spout at the end of screen back to the pulverizing apparatus again to be re-ground.

It is all important in the manufacture of fine pressed brick to have your clay of even temperature, and of even quality. Hence the mixer. While the mixer is comparatively an expensive machine, in furnishing clay to make fine brick it is quite important.

It consists of a box about five feet in diameter with an arm containing teeth similar to a rake revolving around the bottom of this box. This stirs and mixes the clay whence it is dropped through two canvass spouts into the hopper of the press below.

There is nothing further to inspect now in the making of green brick, but to go below to the machine room and see the bricks come from the press, and notice their quality and handling.

The presses stand in a row a few feet apart; they are all working with precision, and the regular movement of the toggles remind us of the walking beam on the Hudson River Steamer. The presses are being supplied with a good quality of clay, and with each revolution up comes four bricks from the bright steel lined molds, each brick as smooth on its face as the gleaming steel coffin from which it arises, and each brick having been tortured with fifty tons pressure it cannot escape the ordeal of fire that awaits it.

There is method and activity at these works without bustle or noise. At each press is a boy busily engaged in taking off bricks from the table of the press and placing them upon a spring truck. Each press is provided with three of these trucks, and another boy handles

the trucks between the presses and the kilns, leaving his loaded truck to be emptied while he returns to press with the empty one to find one loaded and ready for another trip.

These boys have become as expert as men, and will handle 20,000 brick in 10 hours, between press and kiln.

The brick are set at these works three on three in order to obtain as many perfect faces as possible.

I have now gone as far as I have any right to go. I am not a practical burner and cannot say which is the best patent kiln in America. Although I have conversed with many that profess to know. All I know about burning any kind of brick is this:

That a few years ago this seemed to be the only difficulty to overcome, as to dry clay press brick. Now there seems to be no more difficulty in burning such brick than those made by the older processes.

That they are denser and require more heat is not disputed, but the advantages are in their manufacture. The fact that you have a BRICK FACTORY instead of a BRICK-YARD that can be run in any kind of weather, and that you are producing a grade of brick superior to the old, that can be assorted and ground and shipped long distances at a profit more than compensates for the small difference in fuel, if there is difference.

In this sketch I have shown the process of making fine dry clay pressed brick. I believe the dry clay process is the best for making both fine and common brick.

The apparatus, kilns, etc., need not be so elaborate. Good results can be obtained in common clamps and the betterment of kilns, buildings, etc., can come later if there is economy or satisfaction in having them.

I know of places where good brick are made using the clay direct from the bank, and last summer some of the plants I know of made money selling common brick at \$5.50 per thousand.

A word as to making a start in this business may not be out of place. The first thing to be absolutely certain about is the clay. You want a clay that will work to a good advantage on a dry clay press and that will make a good merchantable brick when burned. I would advise any one contemplating such an enterprise to investigate thoroughly first, even if you do so at a considerable expenditure of time and money.

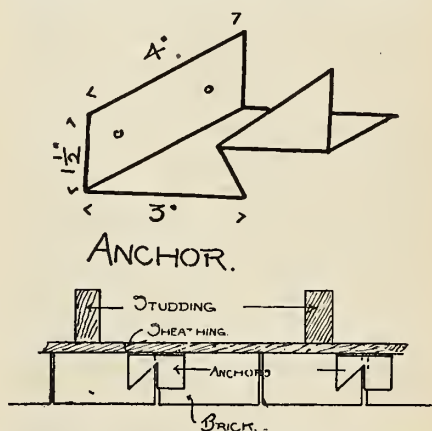
Clays differ so much that pulverizing apparatus good in one clay may be entirely inadequate in another, and a proper preparation of your clay is essential to success. The kind of a press you need depends upon what you wish to accomplish as to capacity, etc. I have known of plants that purchased whole outfits guaranteed at enormous expense that were dismal failures. These are usually stock companies. The stock holders are dazzled by promises of fabulous dividends and have taken the word of some interested expert for all of it.

I thank you, gentlemen, for your polite attention, and will not encroach further upon your valuable time.

A paper read before the Iowa Brick and Tile Manufacturers' Association, Feby., 1892, by H. O. Whitney, Keokuk, Iowa.

ANCHORAGE FOR VENEER WALLS.

This cut shows a method of anchoring brick work to the outside of a frame structure, which was mentioned in last month's CLAY-WORKER. Fig. 1 shows a view of the anchor. It is made of No. 26 galvanized iron. One side of it at the back is formed so as to be nailed to the sheathing. This should be done with galvanized iron nails. The triangular



part which is turned up goes between the ends of the brick in the vertical joint. The rest of the iron lays flatways between the brick and in or between the mortar. Thus an absolute and positive bond is formed. These anchors should be placed one to each fifth course, and one anchor to every other brick in a horizontal direction. This device has been successfully used, and while it costs a little more than merely driving nails into the wood, it is eminently satisfactory.

If inch and a quarter clout nails are used, those interested in the stability of the work can tell the exact number of anchors which are placed on the wall by viewing the nail ends on the inside of the sheathing.

CORRESPONDENCE.

THESE COLUMNS ARE OPEN TO ALL. THE FULL NAME AND ADDRESS IS REQUIRED BUT WILL NOT BE PUBLISHED EXCEPT WHEN PERMISSION IS GIVEN BY CORRESPONDENT. THOSE DESIRING TO COMMUNICATE PRIVATELY WITH ANY CORRESPONDENT WHOSE FULL NAME IS NOT GIVEN CAN DO SO BY ADDRESSING LETTERS CARE OF CLAY-WORKER.

CONVENTION ECHOES.

Admits the Allegation, But Wants
A Recount.

Editor Clay-Worker:

I have read and re-read the letter in the February number, signed "Keystone," and call for a recount. I have not had time to count up the words myself, but I know Eudaly and McCain used twice as many words, each, during the Washington Convention, as I did, and it seems to me that Brother Flood took up more time than all of us put together. Still, brother brickmakers, I have enjoyed it all. The "chestnuts" our Pennsylvania friend alluded to have bothered me for years far more than they have him. It has seemed to me that, as the years roll on, the absence of originality, the lack of new things, the monotonous sameness of our conventions are the dangerous rocks. In the main our methods, our processes and our theories undergo but little change, and I have seriously wondered how long the interest in these annual gatherings could be maintained. The few absolutely new ideas or inventions are of themselves insufficient to make men travel from one hundred to one thousand miles to learn about, and the time is not far distant when the Eudalys, McCains and Puringtons will have completely talked themselves out and then nothing will be left but the social part. This is enough for me, and would be for Eudaly, McCain, Ittner, Ives, Merwin, Crafts, the McAvoyes, the Stiles, Flood, Dingee, Morrison, Adams, all of our Washington brethren and hosts of other royal men, whose friendship is among the precious things of life to me. I own up my mouth is the least profitable but most prominent part of me, but I was made just that way, and I am too old now for "Keystone" to change me very much.

I leave here in two hours for a little rest and recreation in the wilds of Wyoming. During this trip I do not expect to care whether a Chambers or a Penfield is the better machine, whether Pike's or Eudaly's kilns are the cheapest, the most economical or the best. I shall not worry over the price of Chicago brick, or the quality of brick my boys will make during my absence, but if I

meet any of the members of the National Association during my trip I shall take a deal of pleasure in calling their attention to a beautiful silver flask and its contents.

Tell "Keystone" to rub it in. We all deserve it. D. V. PURINGTON.
Chicago, Ill., March 7, 1892.

Wont Be Suppressed.

Editor Clay-Worker:

"Keystone," in your last issue, attempts to criticise some of the members who attended the last convention held at Washington. He says his recollections of the convention were somewhat in a whirl. After a careful perusal of his article I have come to the conclusion that his brain is in the "whirl" yet. For any person who can sit down and count all the words uttered at that convention is a fit subject for some one of the numerous fine buildings erected in the "Keystone" State for the care of the insane. Now, if this tenderfoot "Keystone" imagines he can change or amend the by-laws or extort a pledge from either one of the three members he has mentioned to voluntarily become dumb, he will be badly left, but I would seriously advise "Keystone," before he attends another convention to take a solemn pledge to sit in the hall during the sessions, and not go out so often between acts to see the sights, but probably it's the first time he was so far away from his ma's apron strings; if so, he is to some extent excusable.

But to get down to his article. "Chestnuts." Now, "Keystone," let me ask you, are you interested in some dryer? If so, acknowledge the corn, that you hadn't the backbone to defend either yourself or your agents in the presence of those who would have added just 3,550 words more in telling you what he thinks of you, for I think the principal part of my talk was about dryers, and that is certainly no old chestnut. Now, "Keystone," our conventions are held at the season of the year that brick manufacturers are not very busy, and if four days is not enough time to transact the business in, let us take six, for we don't intend to spend a couple hundred dollars to attend the convention for the mere amusement of shaking hands, and looking at each other, and having a big blow-out.

Now, "Keystone," the probability is the next convention will be held at Louisville, Ky., and Old Kaintuck has always had the reputation of keeping in

stock a lot of fine old whisky. So get yourself prepared for the convention, and don't allow your recollections to get in a whirl, or a whirlwind, or any other kind of a wind, or those Kentuckians will imagine you are one of those carpet-baggers who inflicted the Capital with their frequent and long speeches, or hadn't brains enough to say anything while there, but were a holy terror when they got amongst their associates in ignorance.

JOHN MCCAIN.

Denver, Colo.

Suggestions for Future Work.

Editor Clay-Worker:

After returning home from the Convention at Washington, and reading over again what I heard there, a point or two has struck me as being good to adopt in the future at our Conventions.

1st. I think we have almost too many papers, for the reason—that in the hurry to get through with what business we have on hand it does not give time enough for the discussion of the papers read. In several instances in our last Convention, the members were cut off from discussion owing to the press of papers to be read.

2nd. Why not have three sessions a day instead of two. While together let us get all of the good out of the meetings that we possibly can, and then afterwards do all of the visiting (of the city in which they are held) that we want to.

The Convention went off very nicely indeed, and do not understand me, now as finding any fault for I am not one of that kind. Simply and only making suggestions that may possibly help us in the future. Some of the papers read at our recent Convention were simply *Grand*, and among them were notably—"Labor Troubles, How to Avoid Them," by D. G. Harriman, of New York; also "Brickmaking, Ancient and Modern," by Thos. Moulding, of Chicago, Ill.

This was my first Convention, as I belong to brother McGraw's class, "Only a four year old" in the business, but with him, have nothing to complain of. Did not have any thing to say in the Convention, as my business there was to learn, and not to teach men that were "Patriarchs" in the business.

Allow me Mr. Editor to congratulate you on the *full report* of the recent Convention, and the manner in which it is presented in the CLAY-WORKER.

Trusting that while I remain in the

brick business to be able to meet my brother brickmakers from year to year,
I am, Sincerely D. P. DeLong.

Yes, and Every Brickmaker Ought To.

Editor Clay-Worker:

I have just finished reading the proceedings of the Washington Convention, and I must say I have been highly entertained. I had intended to be there in the flesh, but sickness prevented. Can I become a member by paying the fee of \$2.00? I would like to be enrolled in the Grand Army of Brickmakers and have one of the little souvenir badges. I take great interest in any thing pertaining to the working of clay and I think the National Association has done more to elevate the business and get it out of old ruts than any other one thing (except the CLAY-WORKER). The CLAY-WORKER first, the N. B. M. A. next and, by the way, I don't wish to flatter, but I think the CLAY-WORKER is one of the ablest trade journals in this or any other country. You ought to be proud of it, for I am sure the clayworking fraternity appreciate your efforts and are glad of your success.

Please let me know about the membership. Hope you may live long and prosper.
H. J. CAVERNAUGH.

Old and New Methods.

Editor Clay-Worker:

Last week a kindly invitation was received to renew the bright links that bind the members of the National Association together; but we cannot all relieve ourselves at sight of the numberless duties of the present hour and hence its acceptance in the flesh seemed impracticable.

But there has been a new illustration growing at the "Machine Yard" across the way that has tended to confirm "The Village Brickmaker" in his old fogysm that may be of more than local interest to the craft.

The neighbor formerly had a yard of four hand gangs capable of producing say in good seasons 1,200,000 brick for which he had a steady near-by market at a disadvantage in competition with his friends, by reason of a longer haul, of about fifty cents per thousand; and not being a manager of men, he in an evil hour concluded that both these disadvantages would be cured by the introduction of machinery.

Hence after an inspection of a machine over in New Jersey run on the

sausage-stuffer plan he introduced the same at an expense of nearly \$3,000, and after two years discovered that these brick were not adapted to his trade and many other things that the novice has to learn; the next year he put in an upright square six-mold stiff-mud machine that made a very fair brick but not equal to, or satisfying his former customers; this cost him \$2,000 more; the past season he has laid aside both these purchases and introduced another make almost identical with his second purchase at an expense of a \$1,000 more and added a dry house and more experimental kilns costing \$3,000 additional; his original plant was worth \$6,000, or we have a total outlay of \$15,000, and allowing for working capital \$5,000, the sum of \$20,000, to earn interest upon at 5 per cent. would be \$1,000.00

The machinery represented by the \$15,000 will be entirely worn out in ten years, in fact the two first bought machines are very near the scrap pile at this writing; thus we find the annual depreciation is 1,500.00
Not being an expert he this season employed a superintendent for 1,000.00
A salesman for 800.00
And a yard boss for 700.00

Making a total expense of \$5,000.00

Then his trade being no larger than when he run the hand yard he made only 1,200,000 brick; dividing the above expenses, his brick, without any of the usual expenses, have cost him \$4.16 per thousand.

Now these are the hard nuggets, called facts, and arise with impracticable people every day, in every known business; they simply cannot see the length of their own noses. They think because one man can make money with a brick machine that they can. The Constitution of the United States says that all men are equal before the law; but when persons get the idea into their heads that all men are equal in all things; that it does not require special training and ability for the various callings in life; they have to be convinced by the hard logic of dollars and cents that it is rare to find two men of equal capacity for even a few things.

The machine men would seem to suffer at the hands of these experimenters almost as much as the man who loses his time and money, and it has often seemed a singular fact, that they are willing to place their ware in such

hands, to so soon become a standing and forcible notice of the failure of their goods to do what was expected of them. There are men who can make a success of all they touch, but the machine has not yet been built that will make brick unless it be frequently lubricated with brains, and it mostly requires a first-class article, in fact, to manage any industry as diversified as the brick business is at the present day.

THE VILLAGE BRICKMAKER.

From the Rockies.

Editor Clay-Worker:

After a pleasant holiday of seven weeks I have got back to the City of Sunshine. To say it was a pleasure as well as a profit to be in attendance at the late National Brick Manufacturers' Convention, held in Washington, would be drawing it very mild, indeed. I don't think a single one of those who were there regrets his expenses, or will soon forget the hospitable manner in which one and all were entertained by their brother brickmakers of Washington, D. C. I am afraid they have set an extravagant example for any other city that may hereafter have the honor of entertaining our convention, but they have their reward in knowing that each of us enjoyed ourselves and fully appreciate their kindness; but the members who attended and left their wives and daughters at home have experienced their last trip of grass widower's blessedness. The kindness and overflow of social enjoyment extended to the ladies who were there was of such magnitude and appreciated by them so fully that it will be impossible for any one of us to think of attending a convention hereafter unless his better half accompanies him. My opinion is they will be forming auxiliary associations, and will be having their say with the rest of us.

After leaving Washington I spent a few days in Baltimore, but not being personally acquainted with any of the brick manufacturers there, I didn't visit any of their yards, but hid myself along to the City of Brotherly Love (yes, and sisterly love, also). There I met a great many of my old friends, but contented myself with visiting Brother Dingee's plant (you remember him; the same fellow the Pittsburgh chap styled "old fogie"). Well, if they burn Jim Dingee for an old fogie they will get enough wise ashes from his remains to revolutionize the entire brick business in the city of Pittsburgh.

Think of a man having thirty acres of ground covered with improvements for brickmaking, and not a pound of clay on his place, nor has there been for the last thirteen years, and yet he manufactures thirty-two millions of bricks annually, and actually permits people to haul the stuff to his yard and dump it, providing they pay him ten cents a load for the privilege of doing so. How is that for fogysm? I also spent a very pleasant time in going through his private stable and taking a drive in one of his \$3,000 turnouts. McAvoy, Flood, Siner and all the rest of the old Quakers were at home and seemed happy—all full of praise for the treatment they had received at Washington.

I then went to Pittsburgh, but the weather was so dreadful stormy, with no appearance of clearing, that I only stayed one day (and that in the house), and then started for that wonder of all cities, Chicago. After arriving and spending a couple of days in looking at some of their dug-outs, with sixteen and twenty stories on top, I went around to the office of the King of brickmakers, and found him as jovial and happy as usual. So, after some preliminary sparring, I had to consent to take a trip to Galesburg and see Purington's wonderful plant (right here I want to advise all of our brother brickmakers to never, no never, refuse Brother Purington's invitation to visit his works. He pays your fare, provides a Pullman sleeper for you, pays your hotel bill, furnishes the cigars, and actually will follow you into the barber shop and pay for your shave. When I think of it I feel like jumping up and going back again). Now, for what I saw: A bank of stuff eighty or one hundred feet high, that looks like a bastard blue stone rock. This rock he drills and blasts with dynamite, by touching an electric button in the machine house, thereby avoiding all accidents to his men. Two Chambers brick machines turning out seventy-five thousand bricks each for a day's work, and they get through at 5 o'clock. One of the workmen told me that in the summer season they get through at 4 o'clock. Three Iron Clad dryers and a ten-track dryer of Mr. Purington's own construction. In this last-named dryer I saw the bricks that were made in the morning come out in the afternoon of the same day perfectly dry and set in the kiln. Fifteen Eudaly kilns, all in line (as perfect as a regiment of soldiers on dress parade), three of them burning,

each one being at a different advanced stage, and not a stick of wood or a pound of coal on the premises. Crude oil for fuel, and judging by the seven or eight millions of bricks piled out on the yard, the oil must answer the purpose to perfection. You might as well try to break a piece of pig iron as to break one of Purington's vitrified paving bricks. Mr. Purington has the most compact and economical laid out brick plant it has ever been my privilege to visit. Mr. Purington is very proud of this plant, and he should be. Not a wheelbarrow, brick wagon or horse on the premises, his bricks being all loaded on cars and shipped by rail.

From Chicago I went to Omaha, and there met Mr. F. Cooper, of the firm of Cooper & Goodman, who own the continuous kiln. Mr. Cooper took me out to his yard, but as the yard was not in operation, the kiln was the only thing that I paid much attention to. In my opinion it is the best kiln I ever saw. There are about three hundred thousand bricks piled out which were wheeled out of the kiln, and not a salmon brick amongst them, but all good, straight, extra hard building bricks. About one half of the chambers of the kiln were still full. I examined them and they were just the same as the ones piled out. The kiln's capacity is twenty-five thousand daily, and must be kept going every day in the year. One grand feature of this kiln is, it never wants a dollar's worth of repairs. If the rest of Mr. Cooper's yard is as good as his kiln he has a model plant.

From Omaha I went home, my wife, my niece and myself being well pleased with our trip, and hope we will have our health and money enough to take a similar one next December to Louisville, Ky., where I trust the next convention will be held.

JOHN MCCAIN.

Note:—On my way to the convention I went, by request, to Warren, Pa., and visited the Warren Brick Co's. plant, which was represented at the Convention by Bros. Copeland and Hertzell. This company has a splendid plant, as well as a good clay bank. They have good machinery and a steam dryer, but unfortunately for them the same jackass put up their dryer that put up mine, and made the steam connections the same way he did mine, viz., just the reverse to the way they should be, consequently their dryer is practically a

failure. Why a firm will employ such a man to erect their dryers is past my comprehension, for the man either don't know his business, or else he purposely tries to down the dryer company and bankrupt their customers. J. McC.

Denver, Colo., Feb. 19, 1892.

A Good Showing.

Editor Clay-Worker:

We are making paving brick and, we think, an excellent grade. In order to obtain an idea of the comparative strength of our pavers we recently forwarded half a dozen of them to the U. S. authorities at the Watertown (Mass.) Arsenal to be tested on the government testing machine. Enclose is the official copy by which you will see that the average crushing strength per square inch is 12,363 pounds. A very satisfactory showing to us, especially as we are young in the business. Last year was more of an experimental period with us than anything else, and my first year in the brick business. We use a dry pan, pug mill and Little Wonder brick machine, dry on cars in tunnels with steam heat, and burn in Eudaly kilns. If any of the old timers can beat our pavers for strength and toughness we would like to know it.

R. C. SHENCK,
Secretary Muscatine (Iowa) Terra Cotta
Lumber Company.

After Tim Tinker.

Editor Clay-Worker:

I have just read Mr. Tim Tinker's communication in December CLAY-WORKER, headed "After the Machine Men," also the "ads." to which it refers. I must confess that I altogether fail to find anything to call for the very courteous, dignified and refined expressions, with which his letter is so plentifully interlarded.

It is natural—and the universal custom everywhere, and in every business—for advertisers to express a very high opinion of their products.—Just as the proud parent is apt to view the performances of his offspring through a pair of very rose colored spectacles,—in fact the manufacturer who does otherwise, is in a fair way to "get left." The practical and common sense "prospective enquiring buyer," will, however, always be certain to make the necessary discount.

I notice that many of the "broader guarantees" in said advertisements are endorsed, in the shape of testimonial letters, by disinterested members of the craft, many of whom are gentlemen well

known and respected both in the trade and out of it; and, who, not unfrequently, verify more than the advertisement claims. Are these gentlemen made party to the "misrepresentations," and are they included by Mr. Tinker in his "howling gang of liars?"

Mr. Tinker crying "shame on them" for misrepresentation, defamation, etc., is somewhat suggestive of the mote and beam.

Speaking from experience, I have not, as yet, purchased any great quantity of brick machinery, but the few things that I have bought (from patrons of the CLAY-WORKER) have, in every instance more than justified every claim made for them.

In reply to Mr. Tinker's closing question,—closing questions seems to be Mr. Tinker's "hold,"—the brick manufacturers do not come much into direct competition, owing to the very great addition which freight makes to the price of bricks, while machinery can, of course, be shipped all over the country. This would naturally be a partial obstacle to "more friendly relations, following the example of the brick manufacturers," although I have never noticed anything to lead one to believe *that*, as a rule, anything else existed; but very much to the contrary.

I fear "Friend Tinker" has undoubtedly "cut off more than he can chew," and I hope that he will have the good taste to candidly acknowledge it.

R. M. GREER.

P. S.—Whilst protesting against the strength of Mr. Tinker's sweeping indictment, I agree with him that it would be better if every thing (not alone brick machinery) could be sold strictly on its merits.

"A chain is no stronger than its weakest link," and it would be well if all advertisers would bear in mind, that a misstatement, or exaggerated claim not only reduces the whole thing to the same level, weakening, or entirely destroying the value of the "ad." but is an indirect injury to all others of the same class, causing the entire thing "to be looked upon with suspicion."

As Others See Us.

Editor Clay-Worker:

We enclose herewith postal note in payment of subscription for 1892.

It is impossible for us to do without the CLAY-WORKER and the information in its pages. We only wish it came oftener.

With best wishes, we are

Yours Very Respectfully,
TEXAS FIRE BRICK & TILE CO.,
Athens, Texas, March 2, 1892.

The New York Market.

Editor Clay-Worker:

My last communication informed your readers that navigation was closed on both the Hudson and Hackensack rivers. At present date (March 1st) the ice embargo is gone. Shipments have begun in earnest. The manufacturers here are loading as fast as they can in order to get as much stock as possible upon the market before the present price takes a tumble, as every indication points that way.

Within a radius of forty miles of New York is where the brick comes from that are now being placed on the market; namely, Cold Spring, Long Island, South Jersey, Hackensack and, last, but not least, Haverstraw. The Hudson above that point is still closed with ice, consequently, by the time the Up River brick can reach the market, the prices will be in the condition of Captain Crafts' befogged skipper.

Our enterprising brickmaker, Jas. W. Gillies, was the first to get a barge load of brick from Hackensack to the New York Market. The Merhof Bros. sent out the first sail vessel. Mr. C. Walch the next, and he now has a barge loaded waiting for a tow boat to take her out of the river. Mr. Schmults has a vessel loaded ready to sail as soon as the present snow storm subsides. Messrs. Malley & Rielz will send out a barge of brick this week that will take all their stock of last seasons brick.

The first tow from Haverstraw this week contained eleven barges, all bound for a market that promises a return of \$6.00 or \$6.25 per thousand. The weather may take the "gilt edge" off of those figures in short order, as March is a very uncertain month, and the demand is not very active. There are days when brick cannot be laid but can be loaded and shipped. An accumulation at point of disposal is the result. Bottom prices are in sight in short order. Labor troubles are booming up as usual. The bricklayers made an agreement at the beginning of the year with the bosses for time and wages, which has been faithfully kept. At present the trouble is with the carpenters and hoisters. As a result, the masons are compelled to lay idle while the other parties settle their differences with the contractor. As is often the case, a small cloud contains large destructive power, so the little trouble that is in sight at present may upset values

to an extent hard to be replaced in a presidential year.

The real estate market for the past month has been quite active. Unimproved lots have not made a very large part of the sales.

Prospectively there are some very large buildings to be erected this coming summer. Speculative building is what booms the brick trade.

There is some talk of calling a meeting in the near future to see if there cannot be some arrangement made about less hours, thereby lessening the output of brick. At Hackensack the yards start at sunrise and quit at six P. M. At Haverstraw they commence work at sunrise and quit when the sun drops behind the Western hills. Your readers can see by any almanac the hours made, for—I am going to say \$1.75 per day, but I must confess I am at a loss to say what price per day, as there is talk that there is to be a cut of \$5.00 per month this summer. What a blessing if a ten hour system would take the place of the one now in vogue. On yards above Haverstraw the same time is made as at Hackensack.

I have not heard of but one yard at Haverstraw being leased of the number on the market, and that one was at a reduction. There is one yard here looking for a tenant and I am informed quite a reduction in price is offered to the one that will lease it. At Dutchess Junction the Covert Bros. have released, in which I think they have done well, as it is a pleasure to have for a landlord a gentleman that does not want all that is in the business for his share in the shape of rent.

The firm of Aldridge Bros. at Dutchess Junction, has followed the old maxim, "In unity there is strength," as they have taken another brother in the firm. May the sun of prosperity shine upon them. If any of your readers should be in the neighborhood and have the time to call at their office, they will be amply repaid by meeting active business men, courteous gentlemen, and a firm well versed in all details of brickmaking.

John Derbyshire, who sold out his brick plant at Haverstraw two years ago to the Excelsior Co., and purchased property at Catskill, N. Y., is going West. If he does, the locality in which he locates, if he should embark in the manufacture of brick, will have a brick-maker that will make the best that can be made. The ample wealth he enjoys was made from the manufacture of a

brick that was always in demand, as the brand J. D. was always good.

That rugged old "nutmeg," Captain Crafts, deserves thanks for the stand he took in the convention for the "sunshine" principle of brickmaking. Let them alone Capt. Crafts, they are like Ephraim, "Joined to their idols"—patent dryers and patent machinery. There is more "gaseous" matter in them than solid returns.

I see the name of a brickmaker on one of your committees well known to me, and I must say that if he had taken part in the debate on open or dryer yard, would, I think, have favored the open, although I think he now uses the pallet system. As a manufacturer of brick and with a thorough knowledge of all that goes to make a successful manufacturer, I consider Edwin Brock-way second to none in the business.

I do not run to mathematics like "Keystone" does, but I would like to ask the gentleman that had seven horse power machines on his yard with a million of green brick to be destroyed, and according to his story was, what was he doing with that number of brick on his yard? It looks as if he did not begin his vacation soon enough for his own interest. Lamech's wife was not in it in regard to the size of that yard that would hold one million of green brick in yard and hacks. Shades of our grandmother! Think of four weeks with 42 horses to remove the spoiled brick. Take another vacation Mr. P. Come to Hackensack and I will show you an eight machine yard turning out 23,000 to the pit, three yards to a machine, so that all of the yards and hacks were full, would only hold about the quantity you lost. Brick with us dry slowly, and I have seen almost every hack in the yard doubled up and a heavy storm in progress, but the loss was of no amount, as all hacks were properly battened on both sides and saddled on top.

The air of Washington is exhilarating. Some of your members seem to have made a thorough success of the business in a short time in their minds. As time rolls on, they probably will know more.

There seems a diversity of opinion in regard to the dryer system. If we in this part of the States are to judge of the cost of putting them in, it seems as if there are but few that could do so, even if it would be a benefit. I looked carefully over the papers to see what was the saving in the new fangled

methods, but I fail to see anyone give the cost of drying. A. N. OLDTIMER.

Hackensack, N. J., March 1, '92.

Later: Top prices for brick are \$6.00. Hackensacks \$5.50, with an early decline in view. Brick are expected to arrive this week from Newburgh Bay.

Not a Great Exception.

Editor Clay-Worker:

The year has again rolled round to the time when it becomes necessary to renew my subscription to your paper or stop taking it. As I am still interested in the manufacture of brick and think no one in the business can well get along without the CLAY-WORKER, I again enclose you a postal note for \$2.00 for another year's reading.

I think your report of the Washington Convention is worth one year's subscription. I would very much liked to have been a member and have met with you, but I am getting old, have not been well and cannot go from home as I once could, owing to sickness and death in the family we have had a use for all our money for some time.

We are running an old style hand yard. Made nearly 900,000 brick last season. Prospect for next year seems to be good.

I frequently see statements in your Journal of men who claim to burn a kiln of brick in from three to eight days, including watersmoking. Now, it would confer a great favor on us and many others if the men who can do so would publish the manner of getting a good burn in so short a time. We have never been able to make a burn in less than nine days, and frequently have to burn from fifteen to eighteen days. We use the Wingard kiln.

Yours Very Truly,
EDWARD BROWN.

St. Louis and Vicinity.

Editor Clay-Worker:

Business is booming, and the St. Louis yards have all the business they can handle. New building enterprises are inaugurated every day, and of such proportions as to gladden the hearts of the brick manufacturers.

The buff brick are increasing in popularity, and as their use is extended, a new demand for Terra Cotta in kindred shades is created.

The Illinois Supply and Construction Co. sold out the entire supply of their make during the dull season, and still

have an apparently neverending demand. They have secured some very large jobs, particularly the "Famous" and "Knox" buildings, on Broadway, extending from Morgan to Franklin Ave., and the Drew building on 12th and St. Charles. They are figuring on some other large jobs, but of course will not as yet, publish the names. They are having many inquiries regarding the Cooke Hydraulic Press, and are confident it will supercede all others.

The Hydraulic Press Brick Co. are always in the market, and almost always on top. They are pushed to the limit this season, however, and are rushed to keep up with their trade which extends from Coast to Coast.

The city has condemned the property occupied by the Excelsior Brick Co., at Leffingwell and North Market Sts., for the purpose of running a street through it. The Company, as a consequence, will go out of business, though just when is not decided. They have a heavy stock on hand which they will first dispose of. The officers of the Company have not yet decided what they will do,—whether they will reorganize and continue in some other section, or embark in other lines of business.

Among the Tile and Culvert Pipe men, the season has not yet opened, though there is a strong inquiry which augurs well for business as soon as spring is fairly here. Business for the time of year shows a gratifying gain over the corresponding time last year.

Estimates and bids are being prepared here for some nice municipal jobs, particularly in Greenville, Miss., Athens, Ga., and Spartansburg, N. C.

Blackman & Post are confident that their spring season this year will exceed any previous one. They are doing a nice trade now, and are bidding on many extensive sewer jobs.

Evans & Howard have moved into their new office, though it is still incomplete. It occupies the western part of their premises on Market, between 9th and 10th Sts., and is a handsome structure. A new front will be put in the old office (on the east side of the lot), and there will be an arched driveway between the two buildings. The new building is novel and attractive in appearance, the materials entering into its construction are all the product of Evans & Howard's own kilns.

A. SCRIBLER.

THE CLAY-WORKER.

OFFICIAL ORGAN OF THE NATIONAL BRICK MANUFACTURERS' ASSOCIATION OF THE UNITED STATES OF AMERICA.

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T. A. RANDALL & CO.,

81 Massachusetts Ave. Indianapolis.

OF GOOD PROMISE.

From all quarters of our great country come reports of an awakening among the brickmaking craft. After the calm of a winter's rest the brethren are again bestirring themselves. Old yards are being overhauled and enlarged, while new factories are being erected and equipped with a speed characteristic of this progressive and drive-ahead age. If there is anything in signs we are on the eve of a most prosperous season. Judging from the general drift of our correspondence the coming season will be one of marked activity the country over. Never in the history of the CLAY-WORKER have we, in the same length of time, received so many subscriptions (both new and renewal), and such a continuous demand for specimen copies as during the first quarter of 1892, and this to us is an unfailing indication of busy times for the clayworking crafts—a sort of trade barometer that foretells fair weather and favorable winds for the industrial ships now getting under way. We earnestly hope they may all make successful and profitable voyages.

ENGLISH TILE IN AMERICA.

There is, in the Denison House of this city, a most excellent advertisement for American Tiling. The floor of the splendid lobby and office room of that hotel is laid with English tile, made

by Maw & Co. The work of laying was done by The Henry Debbles Company of Chicago; which is a guarantee that it is as well done as the tile will permit, for they have had a large experience in this line. With the tile used in the Denison House however, it is not possible to make a good floor; they are irregular on the surface, the edges are spalled, and the color is not uniform.

The reputation of English tile was made before tile were made in America. We are inclined to the belief that these Foreign tile were used because the purchasers are not familiar with the excellence of the American product. In course of time education will develop the right thing, and the English product will stay on the other side of the water until they can make something which is really better than comes from our own manufactories, and they will have to improve their tile very much if that in the Denison House is a fair specimen of their product; it is irregular as to surface and color; good workmanship was rendered impossible by the character of the goods, and people who come in the front door and see set into the floor the advertisement of those who laid and those who manufactured the tile, will know well enough what not to do.

Throughout our city there are American tile floors with which a comparison can be made. The justice of our remarks can be sustained by a comparative examination.

THE LESSONS OF THE STRIKE.

Our most distant readers know that for the closing ten days of February the entire street car system of Indianapolis was tied up by a strike. No matter, for the purpose we now have in view, who was to blame, or, what was the cause or causes. It was a strike which laughed at the loss and inconvenience of an entire city, which had in good faith adjusted its business and social affairs to the system of transportation which street cars are supposed to furnish, and none were greater sufferers than the wage earners, who are themselves members of trades' unions, whose place of residence is in many instances from three to five miles from the place of their employment; while merchants were deprived of their usual business and the schools were greatly damaged. The loss to the company was immense, but, after all, the greatest sufferers were the strik-

ers themselves, in loss in wages, and in forced contributions to the funds on which the strike was fed.

The first thought that will impress a reflecting man is that the public should be protected against such losses and inconveniences as attended this strike, which is only another form of saying, that the public should protect itself for the people make and enforce laws. No body of men has any right, in adjusting their own grievances, if they have any, to inflict such wrongs upon everybody else. This was to no considerable extent a war upon the owners of the road, it was a war upon the city. It was as if a mob had shut off the water supply from the people of the city and but little less disastrous, for substitute water could have been nearly as easily provided as substitute transportation, and to this conclusion thousands are coming whose sympathies were and are with the employees in whatever they are oppressed by their employers.

As in no other strike of late years the attention of the public is focusing upon a truth hitherto almost lost sight of. The blow was aimed at the poor laboring man, and all the denunciation of the employers was merely the "stop thief" cry intended to divert attention from the real victims. If the employees who were dissatisfied with their wages and conditions had quietly walked away from the stables, as they had a right to do, singly or in a body, the cars would not have been delayed an hour, and they would have run on full schedule time in less than twenty-four hours. There were a thousand laboring men who would have rushed to the stables only too glad to get such a job at such wages but the strikers drove them back. They would neither work themselves nor let poor men work whose families were in real need, and now men are discussing, as they never discussed before, that phase of the labor question which assumes that the profitable employments of the country belong exclusively to guilds and unions—to organized labor, as it is called. Shall the wealthy laborer who has grown fat on wages much above the average take such absolute possession of all good jobs that they can derange the entire business and social affairs of a city by keeping poorer laboring men from taking the places they vacate? This is the underlying question of all. Is there any remedy? The popular thought is that there should be some method of arbitration. But this is based

upon the assumption that the owners of a factory or shop or railroad, and those who operate them have equal rights to possession. This is subversive of all civilized notions of the individual ownership of property. By universal consent the man who owns a farm has a right to employ whom he pleases to work it, and he may, if he chooses, work his own son or sons with one hired man or ten, as he deems best. Why may not the man who owns a mill do the same? He may not put his own sons in his own mill but by the consent of the guild. When an employe of a farmer is dissatisfied with his compensation he leaves and the farmer may employ another. Why should not this apply to mills or railroads? Arbitration is proper when rights are equal but arbitration is valueless without power to enforce the award. In this special case the disagreements between the company and the employes had been investigated a week or more by arbitrators, and they agreed upon the questions brought before them, but, one or both parties refused to abide by the award, and this ten days strike ensued. Some talk of a State Board of Arbitration, whose decisions should be final. A bill to establish such a board was introduced in a late session of the Indiana Legislature with a great flourish of trumpets, but when the friends of the measure began to consider the method of enforcing the decrees of the arbitrators, they were brought face to face with the facts that to compel the employes to accept distasteful conditions, was to reduce them to slavery and to compel the employer to submit to the decrees of another was to confiscate his property, and the bill never reached its third reading.

To a limited extent arbitration is proper, but it must be voluntary on the part of both, but no one is entitled to any arbitration who is not willing to turn the property he is handling over to the proper owner whenever that owner demands it. The employing of a man does not give ownership in time, no more does this handling of the plant of another give ownership of that plant or any part of it. The only possible remedy is for every man to be allowed the equal rights of every other man. Where freedom exists there can be no oppression of the poor. In this case the greatest tyrant is not money capital but the capital that is represented in organizations that drive away from employment the poor man who seeks to earn a living for himself and family because he is not

rich enough, or from any cause, does not wish to become a member of the guild.

This strike has brought to light facts that demand the most earnest and careful consideration of every citizen. The immediate strikers constitute but an insignificant portion of a powerful combination, all of which is pledged to stand or fall together so that what was so easily done to the city of Indianapolis may as easily be done to the whole people by concerted action against the railroads of the country. For any real or imaginary wrong to the employes of the least important railroad in Maine or Texas the whole railroad system may be tied up for weeks, or until the ostensible owners of the railroads accede to the demands of the real owners, the Brotherhood of Railroad Employes. Let this happen, as it is now proposed it shall happen, during the World's Fair, when every interest of the world is depending on the regular running of trains, and the confusion and distress which obtained in Indianapolis for two weeks, will be felt the world over. The contemplation of the mere possibility of such a state of affairs is not pleasant, yet when slavery imprisoned or murdered citizens of the United States because they did not accord to slavery all it demanded, it no more foreshadowed the seas of blood that followed than this strike foreshadows a fierce struggle for the right of owners to control their property, and the right of poor laboring men to seek employment without fear of the tyrant which now stand with cudgels over them.

THE BRICK BUILDER.

There is a new missionary in the field, another advocate of better buildings—The Brick Builder, an illustrated, monthly magazine devoted to the advancement of brick architecture. We shall be happy, indeed, if any work of ours may contribute to the material success of this able advocate of a worthy cause. This journal, carefully edited, copiously and artistically illustrated, will do a great deal for good building. It always requires some boldness and a certain amount of risk to enter a special field, which presents no records of previous successes to justify an effort. The Brick Builder deals with brick after they have been marketed. The CLAY-WORKER deals with brick in the process of manufacture and marketing. As an advocate, we suggest uses for brick and clay products for the purpose of enlarg-

ing the field. The Brick Builder takes up the work where we leave it, and deals with brick and clay products in an artistic and constructive spirit. With its well selected examples, its beautiful illustrations and trite suggestions, we can see that the building world will be made better by the existence of this publication. And we shall hope that brickmakers, as well as brick users, will see and appreciate the work that is being done for them in the higher education of the people, and do their share in the support and encouragement of this journal. It is certainly not out of place for us to say here that the work of special journalism in all lines is doing an incalculable amount of good in the rapid advancement of all of the world's interests. We welcome the new missionary, which is published by the Brick Builder Publishing Company, P. O. box 3282, Boston, Mass.

TO BENEFIT THE MASSES.

Colonel Albert A. Pope is a modern philanthropist. Such an one places philanthropy on a basis that benefits the country and profits himself at the same time. This is the high kind of philanthropy. In order for philanthropic work to be certain of continuance it must pay somebody besides the general public. If it does not, it will not receive the highest grade of business attention. The best class of business people, those who can really do something, will not give their attention for any great length of time to anything which does not pay them. In the goodness of their hearts the very best kind of business people will often become quite enthusiastic in some philanthropic work, but if it does not pay it is an exception when they continue it.

Who is Colonel Albert A. Pope? What is it that he is going to do that will help the rest of the world and, at the same time, himself? He is at the head of a bicycle manufactory. He has founded the department of road construction in the Massachusetts Institute of Technology, and the Pope Manufacturing Company now offers \$10,000 worth of bicycles to students who will write the best essays on good roads. In this Colonel Pope does a great deal more for the country than he does for himself. He is entitled to all the benefit that he can get out of it personally, and we gladly give publicity to his name and his work in this connection. Our road tax is one of the greatest drains in this republic. We pay immense sums

of money for transportation over country roads that is worse than wasted. Col. Pope knows that if he had good roads he could sell more bicycles. He is going to help the country to get better roads, and we hope he will sell more bicycles.

LOOK BEFORE YOU LEAP.

If you are going to enlarge your plant or change your process this Spring,—look before you leap. The common notion that any machine is good enough to make brick with, has cost many men many dollars. Before you spend several thousand dollars for machinery, investigate. Don't take anybody's word for it; investigate for yourself. Go and see the machine you are buying. See it in practical operation on a yard. See it in process of manufacture if you can. Above all, learn to know the men you are dealing with. If you are not a mechanic yourself, your only real guarantee that you are getting an honestly built machine lies in the intelligence, the integrity, and the high business standing of the manufacturer. Such manufacturers do not fear the closest investigation; they have a reputation to sustain and cannot afford to deceive.

A few dollars, or even a few hundred dollars, spent in gaining information and experience before hand, may save throwing your high-priced machine into the scrap pile afterwards. Don't be "penny wise and pound foolish." A prominent brickmaker from California, himself a mechanic of no mean ability, recently said in speaking of his visit to the works of Messrs Chisholm, Boyd & While at Chicago, "What I learned there about machinery and making brick was worth to me the whole trip across the continent."

The season now opening promises to be a very active one, and hundreds of thousands of dollars will be spent by the brickmakers of this country in improved machinery and methods. Therefore, in the interest of all our readers, we repeat the warning: Before you buy, investigate.

Michael McGraw, an employe of the Fire Clay Company, at Salina, Pa., was killed by an explosion of dynamite yesterday. He was blasting fire clay and one charge failed to explode. McGraw went to examine it, when a explosion occurred, killing him instantly and mangling his remains in a frightful manner.

SOMETHING NEW.

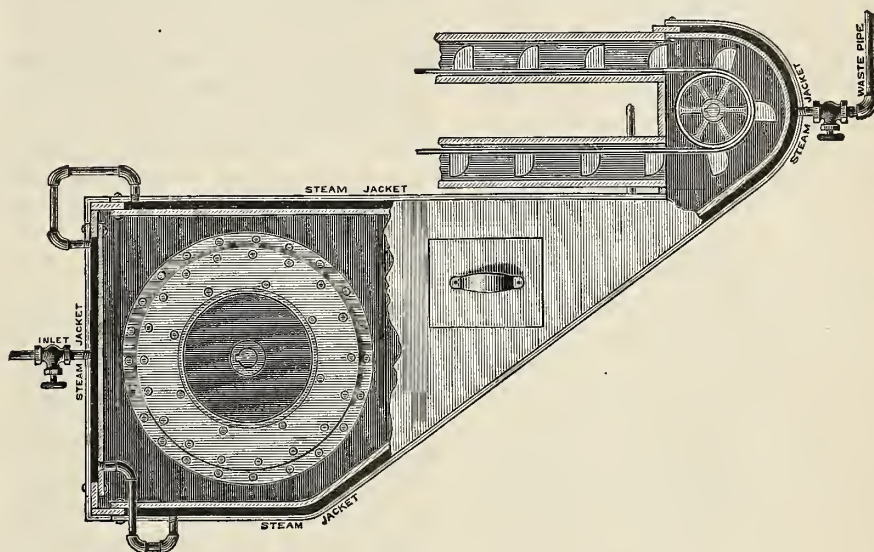
He who thinks that "there is nothing new under the sun" is a back number. We are sure that the readers of the CLAY-WORKER are not of that class but must, all of them, appreciate the many new labor saving devices and improved machines that are being so well illustrated in its pages from month to month. One of the latest things out in the clay machinery line is shown in the accompanying illustration.

There is no known machine that will so thoroughly disintegrate and pulverize clays and other substances as *Williams' Cyclone Mill*. It thoroughly disintegrates all kinds of clays and shales.

When the clay is damp or wet it adheres to the housing and sometimes

INCREASED USE OF BURNED CLAY

The field widens for the worker in clay. During the last month we have devoted considerable time and energy to laying before our readers just what the future may bring. The making of brick for ordinary building purposes will always be a part of the business of clayworkers, as a class. However, there are great possibilities beyond this. The growth of the business of making fire proofing material has been great, indeed, however, there has only been a start. There is much more to come. The public is beginning to see and understand the opportunity and the advantage of a better class of buildings. Whenever the public sees that a better class of building pays, it will put the money



causes choking of the mill. To obviate this we have introduced clearance rakes which answer all purposes as long as they last; but they soon wear out. We now have found a remedy for all these evils. It is *Little's Patent Steam Jacket*, represented in above cut. It encases the Pulverizer entirely and at the same time forms the Elevator Boot. By the use of this combination, clays can be worked directly from the bank; but it is preferable to cure them in a dry-shed for dry-press brick making. By the use of the above combination it is *absolutely impossible to choke the Pulverizer or Elevator Boot*, and, therefore, no dry-press brickmaker can afford to do without it when he once knows its value. Patented 1890. Other patents pending. For further information, write to Milton F. Williams & Co., 2705 and 2707 North Broadway, St. Louis, Mo., manufacturers of complete outfits for brickmakers. See "ad." on page 334.

into them. We have passed the pioneer period of building in a large part of the United States; yet we sometimes continue pioneer methods after the reason for them has ceased to exist. Cheap structures are all well enough in a newly settled section where interest is high and the earning capacity of property great. However, if competition increases as money becomes cheaper, and its earning capacity becomes less, the cheap structure, the one which requires constant expenditures for repairs and high cost of insurance, is found to be out of place. It is true that people do not recognize this condition at once. Conviction comes slowly. But with the object lessons before them the change comes surely.

Thus there is working out enlarged knowledge of the possibilities of fire-proofing material. It will soon cease to be the material for only great structures in great cities. There will be a moder

ate use of it in all commercial structures in moderate sized towns. The public will learn that an iron column or an iron lintel unprotected by fire-proofing is a thing which should not be permitted in any structure. In the past we have believed that destructive fires were necessary, and that all we could do was to protect ourselves by insurance, but this is not true. Protected iron renders a building slow to burn, and thus capable of defense against fire. The so-called fire-proof structures of the past have often been so named merely for the commercial advantages which might accrue to their owners, and the idea of fire proof structures has suffered because of this charlatanism. But outside of fire-proofing we have roofing tiles, enameled brick, and now our foreign correspondent mentions a large use of gable coverings and terra cotta gutter moldings, which is a recent feature in French architectures. There is certainly with us a tendency to better things in building. While an idea goes slowly at first, when once well started, its adoption becomes the usual rather than the occasional circumstance. Only a few years ago fire-proofing was very rare, indeed. Now in our great structures of the large cities, it has come to be regarded as a necessity. From this the idea will spread. Tile roofing is now coming to be understood, and while it is by no means common, only a few years will be necessary for its development. A few prominent examples of enameled brick work in each of the large cities, and the knowledge that people can get them at moderate prices, will insure their introduction. Every kitchen of every house of moderate cost will contain a few; water closets of all public structures will be lined with them; the hall ways and corridors of all tenements and commercial structures will be laid up in enameled brick, and, in truth, in all buildings where absolute permanency and cleanliness are appreciated, enameled brick will find a place, and thus a large trade will be developed.

Louis Jackson, industrial commissioner of Chicago, has issued a circular showing where good clay for brickmaking may be found on the C. M. & St. P. road. The places mentioned in Minnesota, within fifty miles of St Paul, are Carver, Castle Rock, Dundas, Farmington, Faribault, Hastings, Lakeville, Mendota, Red Wing and Shakopee.

IDENTIFICATION AT BANK.

Few courtesies are more dangerous than the identification of payees at a bank. That you may be called upon to leave your business and go a half a mile to do this is not to be complained of, though it sometimes involves a great sacrifice—that is what people live for, to help one another, but the danger is in being picked up as you go in or out of the bank by some one who calls you by name and reminds you that you know him, though you have no recollection of ever having seen him before, until he reminds you of some circumstance that evokes the shadow of some forgotten occasion, and you step up to the bank counter and say, "This is John Smith, Mr. Teller," and then he gets money on a check or draft. It may be all right, and usually is right, but sharpers have used this courtesy and been identified as the rightful payee, when the paper was stolen. In such a case you become responsible to the bank for money paid to the wrong man, through your intended kindness. Be sure that you know your man.

TOO FAST FOR HEALTH.

When steamboating was young on the Ohio River, it took a boat about a month to make the trip from New Orleans to Louisville, but this was so much better than footing it through the Indian country that the boats found plenty to do. In the course of a few years an improved class of boats made the trip in two weeks, but it often happened that none of these were in port when passengers were ready to start, and, as there was no way of telling when they would be, the old boats often picked up passengers. On one of these occasions the old boat crowded with passengers had not gone far until she began to meet new boats. These soon unloaded and started on their return trip, so that before the old boat had reached Vicksburg several of these had passed her, much to the disgust of the passengers. To a group of these who were one day giving vent to their indignation, the Captain said: "Gentlemen, you don't understand yourselves. At the speed those boats are making every passenger is liable to take cold and die by the sudden change in latitude. This boat is going as fast as a change in climate is good for your health."

Conceding that some people go too slow for their own good or the good of

anybody else, we wish to emphasize the captain's suggestion, that some people go too fast for their health. Whoever borrows money to build a costly house, or to furnish even a cheap house with costly furniture, goes too fast for his health. Many a man has built so nice a house that the sheriff has had to turn him out of it. Whoever buys anything "on payments" pays nearly double the cash value of it. He is going too fast for health. Better wait until, by your savings, you have the cash to pay down. Whoever runs an account at the corner grocery to be paid at the end of the month, pays largely more for goods than he would have to pay spot cash. He is going too fast for health. Better do on less this month and the next, then have cash ahead after that. Whoever invests in some scheme that is to be so managed by others as to return him ten fold in a short time generally loses all he invests. He travels too fast for health. Permanent wealth comes from small but certain savings.

HOW TO SELECT A BRICK PRESS.

The perfect Brick Press should be pleasing to the Eye, the Ear, the Intelligence and the Pocket.

A Press that is not well proportioned and well finished is not pleasing to the Eye. A Press that rattles, clatters, and bangs is not pleasing to the Ear. A Press that is not built on mechanical principles, and is not perfectly adapted in every part to its work, does not please the Intelligence. A Press that is not a constant worker, and does not make the best brick, is not pleasing to the Pocket; far from it.

The Boyd Brick Press pleases the Eye, the Ear, the Intelligence and the Pocket. Therefore it is the Perfect Brick Press. See the Improved Boyd, 1891 pattern. and you will have no other.

The Reason Why. Few people buy a Brick Press without investigation and comparison. After investigation and comparison, few people buy anything but a Boyd Press. This is why the manufacturers of the Boyd Presses sell more machines than all other dry press brick machines manufacturers combined.

Several months since a barge loaded with 40,000 brick upset in Puget Sound, near Tacoma. An expert diver is now at work rescuing them at a cost of \$5 per thousand.

DETROIT ITEMS.

Joseph H. Clixby sustained a severe loss by fire. It is rumored that some unknown party had placed a pot containing chicken in the platting of the kiln just burned, the roof caught fire from the terrible heat escaping from the hole where the chicken was cooking.

The past month has marked a decided increase in the demand for brick. All brickmakers experienced larger sales than for the month of January.

The Hall Wolf Co., who have a daily capacity of 160,000 brick, will furnish the brick for Detroit's new Union Depot, which will require something over 2,000,000.

The Detroit Pressed Brick Co., is the only firm here who use a brick dryer. They have been making brick nearly all winter. The only loss they experienced was caused by snow melting and dripping through the roof on the brick while in a green state.

Goldner & Sons have improved their kiln shed to such an extent that it is now almost a new structure.

Mr. Jacob Knell is agitating the merits of his latest improved iron double tempering shaft brick machine. If the machine is what is represented, it will be a welcome addition to the brick-making fraternity. It will in all probability be tried the coming season, and if it works successfully Mr. Knell will find many purchasers in Detroit. Mr. Knell is well known here, having made Detroit his home for nearly a quarter of a century.

There has been another attempt to buy up all the brickworks. A number have already sent in their options. Whether this second attempt will be successful, I am unable to state. R. H. Hall procured the options.

There is reason to believe that Natural Gas will be discontinued altogether. The principal objection to gas is: It does not give the best results as a fuel for brick-burning purposes. It is said that the Michigan Gas Co. will concede to the price exacted by the brickmakers.

Dennis Burke, in a few days will have all his stock sold out. Mr. Burke has been one of the busiest brickmakers during the season. Mr. Burke, as well as other brickmakers, will begin as early as possible, making brick.

Crude oil has been offered for brick-burning purposes at \$0.80 per M. It is

safe to say, if pipes are laid it will be used exclusively.

The prices will probably be advanced before the 1st. of April, as by that time the stock in the market will be very light.

That massive structure, Woman's Hospital and Foundlings Home, is just completed. It is found necessary to erect an addition, which will require 225,000 stock brick for facing alone. The brick for the Hospital were furnished by Greusel Bros., who are under contract to furnish the brick for the addition.

DORTHY DALE.

TRADE LITERATURE.

ARNOLD'S 1892 ILLUSTRATED CATALOGUE and price list of brick and tile-makers' supplies is at hand. It is an attractive little book containing cuts and descriptions of almost everything used about a brickyard or tile factory. Our readers can obtain a copy by addressing D. J. C. Arnold, New London, Ohio.

THE ST. LOUIS IRON & MACHINE WORKS are out with an illustrated catalogue of their clay-preparing machinery, the Lion Brick Machine, engines, etc. They have recently made an improvement in this well known press that entirely does away with the granulation in the center of the brick. The device is very simple but effective. For full particulars or copy of the catalogue write them, mentioning the CLAY-WORKER.

STREET PAVING is the title of a neat little pamphlet issued by the Grape Creek (Ill.) Clay Works. We presume a copy will be mailed to any of our readers on application.

THE VIRGINIA BRICK Co., Washington, D. C., has favored us with a copy of their illustrated catalogue and price list of plain, pressed and ornamental brick, of which they make a great variety. This book is evidently not intended for general circulation, but we presume that those of our readers who are particularly interested in that branch of the work, or may desire to purchase ornamental brick, can secure a copy by writing to Chas. B. Pearson, treasurer and manager of that company.

"COMPLIMENTS OF THE SIMPSON Brick Press Co., 87 Washington street, Chicago," is the inscription on the front cover of a large ten-page pamphlet recently received. As may be surmised the matter and illustrations are of the Simp-

on Dry Press Brick Machine, which, we take it from the testimonial letters given, is doing excellent work. Copy will be mailed free on application.

FURTHER PROOF.

The following parties have tested our kiln and say it does all we claim it would do: John Murphy, Versailles Ohio; J. A. Rumer & Co., Ridgeway Ohio, and Levi Bowers, Big Springs, Ohio.

J. Thompson & Sons, Fortuna, California, say: "We have received letters from six users of your kilns and five of them speak in the HIGHEST TERMS in their praise. The sixth has not succeeded with it, probably, owing to the fact that he uses gas for fuel. We wish to put in one of your kilns.

We commend Mr. Thompson & Son's mode of investigation. We are well aware that our claims are disbelieved by a very large per cent. of kiln users throughout the country, therefore in getting evidence, do as you would do in other cases, get what you can and determine accordingly.

Nothing has yet been devised that has not proved an utter failure in the hands of the few. We do not, however, believe that our kiln has failed in a single case in the hands of a practical operator, unless, as we believe, the operator attempted to fire too rapidly before getting acquainted with the kiln, or attempted to begin where we left off, and so equal or excel us in question of time as given in our circular.

We did our test burning after having had fourteen years of very careful and very cautious experience with our clay, four years of which was with our patent kiln. Our instructions for burning do not contain the semblance of an intimation of such burning being practical; especially to begin with; yet for correspondents we are satisfied that there are clays that will burn more quickly than our own, but it is best to make haste slowly.

Send your address on a postal card but do not build our kiln unless you so desire. Our circulars need do you no harm.

STEWART BROTHERS.

Mt. Victory, O.

If you want anything you haven't got or have something you don't want, read or advertise in our "Wanted, For Sale, Etc." columns.

EDITORIAL NOTES and CLIPPINGS

Pierce, Neb., is to have a brickyard.

A brick plant is soon to be built at Rock Valley, Iowa.

J. D. Leedy, Bourbon, Ind., will buy a tile mill in the spring.

A brick and tile plant is to be put in operation at Flatonia, Tex.

Alfred Henson will operate a small brickyard at Hagerstown, Md.

The Alfred Centre, N. Y., brick and terra cotta works will be enlarged.

A company is being organized to establish a brick plant at Carrollton, O.

A company is being organized to establish brick works at Brenham, Tex.

Furgerson & Mish, Crawfordsville, Ind., will put up a dry-press machine.

A brickyard is to be started at Deadman's Hollow, Pa., by James Fleming.

Williams & Co. are going to establish a brick and tile plant near Black River Falls, Wis.

James Conway, B. H. Knowles and Peter Wister will operate brick works at Bryan, Tex.

P. W. Parkhurst will operate a brick and tile factory at Victory, Ohio, the coming season.

N. J. Baker, M. Cavanaugh and G. Verrill will establish brick works at Holyoke, Mass.

Augusta, Ga., is agitating the paving question, and brick will probably be given a trial.

Chas. Seelbach, Lexington, Mo., wants to communicate with parties having a good summer brick plant for sale.

W. H. Dunn, Richmond, Va., is investigating the dry-clay process, with a view of starting a brick factory.

The Harrisburgh, Pa., market is in a very healthy condition, and prospects are good for a very prosperous season.

The South Milwaukee (Wis.) Brick Company has been organized. A large plant will be built early in the spring.

The Atlantic Brick & Tile Company has failed, and the works at Bakerville, N. J., will be sold by the sheriff Mar. 22.

Francis F. Alexander, a well known potter of Syracuse, N. Y., died the 7th inst., after a long illness, aged forty-three years.

Mills P. Pharis, president of the Onondaga Pottery, Syracuse, N. Y., died of heart disease March 2, aged sixty-six years.

The Washington Pottery Co., Spokane Falls, Wash., want to purchase a flower-pot machine—one that makes pots with fluted rim.

Courser & Bartlet, of Dover, N. H., have purchased Benj. Mathes' brickyard in Durham, and will put in operation early in the spring.

The Capron (Ill.) Brick & Tile Company has been incorporated by L. F. Brayman, Barney Cornwell, H. R. Willard and others.

The Milwaukee Tile & Terra Cotta Company has been incorporated by C. L. Classen, Gus Podell and Bernhardt Schmidt. Capital \$10,000.

The Bell Pressed Brick Company has been organized by John F. Bell, E. H. Hudson and H. J. Arnold, of Denver, Colo. Capital \$30,000.

Twenty-six thousand dollars has been subscribed by Wooster, O., capitalists for the purpose of securing a company to manufacture shale brick there.

W. P. Chandler, Farmerville, La., wants to purchase a brick machine, 10,000 a day capacity, which can be run by a twelve horse-power engine.

The U. S. Brick Press Co., Chicago, write that business is exceedingly good with them, and is increasing constantly as their press becomes better known.

Spencer M. Alpaugh, of the Empire Pottery Works, Trenton, N. J., died at Jacksonville, Fla., February 27, of typhoid pneumonia, aged fifty-one years.

David White and Peter Melmoe, contractors, have purchased James Brown's brickyard near McKeesport, Pa., and will enlarge same for the coming season.

The Terra Cotta Brick Co.'s works, corner Root and LaSalle streets, Chicago, were partly destroyed by fire March 8, caused by bursting of an oil pipe. Loss \$14,000.

The Wolff-Wendel-Labahn Brick Co., Chicago, has been incorporated by Frederick Wolff, Charles Wendel, John F. Labahn and Chas. Labahn. Capital, \$40,000.

S. A. Weltmer, Tipton, Mo., contemplates establishing a dry-press brick factory near that place, for the production of fine front brick, and wants catalogues and prices of presses, etc., etc.

The Hutsonville Brick, Tile and Mining Co., Hutsonville, Crawford County, Ill., has been incorporated by R. W. Canaday, Chas. W. Keys and others. Capital \$25,000.

The Pine Bluff (Ark.) Brick Co. has been organized and works will be built at once. Mr. John O'Connell is president; A. Brewster, secretary and treasurer; and Samuel Leflar, manager.

Benj. Thompson, general manager of the East Chattanooga Land Co., writes that they have a very good clay for brickmaking, and will probably start a brick factory the coming season.

The City Council Baltimore, Md., is considering the appointment of a city brick inspector, at a salary of \$1,200 a year, whose sole duty it will be to inspect all bricks bought by the city.

February 27 a terrific gas explosion occurred in the pottery works of Knowles, Taylor & Knowles, East Liverpool, O. Three workmen were fatally hurt and considerable damage was done to the works.

J. W. Kane, formerly superintendent of Wahl Bros.' brick works, near Chicago, has secured an interest in the Badger State Brick & Tile Co.'s works at Granville, Wis., which will be rebuilt and enlarged under his supervision.

Ex-President J. C. Adams' brick works at Sheridan, Ind., have been running' throughout the winter, and are now turning out a grade of brick that "Jesse" says can not be excelled by any soft-clay yard in America. He is using a Potts horizontal stock brick machine, and commends it very highly.

Many manufacturers are now arranging for various improvements in their works for the coming season. The putting in of new machinery of large capacity will leave them with small machines and appliances that are to all intents and purposes as good as new, which may be easily disposed of by a small "ad." in our "For Sale, Wanted, Etc.," column.

The building season is opening up in a very satisfactory manner throughout the country. In our own immediate vicinity the prospects are good for one of the most active and prosperous seasons Indianapolis has ever known. Several large blocks are now under way and others are being contracted for. The price of brick is low, ranging from \$6.50 to \$7.00 a thousand, but the demand will, no doubt, cause an advance ere long.

Danville, Ill., is to have a paving brick plant.

A large brick plant is to be erected at North Riverside, Iowa.

News was received recently of the incorporation of the De Witt Brick and Tile Co., Little Rock, Ark., with a capital stock of \$1,000.

Harrietta, Mich., wants a brickyard. There is plenty of good clay, and fuel is cheap. It is thought a bonus will be offered a practical manufacturer.

Wm. L. Garritee, one of Baltimore's best known builders and brick manufacturers, died of apoplexy Friday, the 11th inst. Deceased was seventy-two years of age.

The Philadelphia brick manufacturers held their annual banquet on the first inst. There were about fifty present, and a royal good time was had, as may be imagined by those who know the good brethren of that city. Their capacity for social enjoyment is very great.

Mr. Fisher, of the Newbern (Ill.) Press Brick Co., states that business is first-class in his section, and that his company have built up a local trade in and around Newbern far in excess of their anticipation. They are about to put in a new press to make fancy, radius and edge brick.

Will H. Coleman writes that he has concluded arrangements with the Jennings Machine Co., Philadelphia, to manufacture his Rapid Handling Appliances for the economical carrying of clay and clay products. Mr. Coleman has worked out some important improvements in this connection, and will soon be prepared to lay them before our readers.

The Imperial Brick Company is the name of a new manufacturing industry, with \$100,000 capital, to be located at Canton, O. Mr. E. D. Keplinger, a prominent business man, is at the head, with other well known men interested. The company has purchased eight acres of land south of Canton, where they will erect a plant. This will make the fifth brick industry in that city.

The Garden City Brick Company and Thos. B. McAvoy, of Philadelphia, have started their yards. The latter, with his son, Frank, is prospecting for a material to make a vitrified paving brick, and they think they have found it, too, although they are as close as the

proverbial clam, and wont say a word as to the locality. If they have made the discovery we predict a revolution in this branch of the trade, as they are going after the city's work.

All of the Hydraulic Company's presses at St. Louis are in operation, and the Collinsville yard, the capacity of which was about doubled during the shut down, is ready for business. The managers of this company's yards met during the last week in Feb., and made an inspection of the entire St. Louis plant. Views were exchanged and many valuable ideas were picked up during the meeting, which wound up with an elegant lunch at the Mercantile Club.

The Illinois Supply & Construction Company are now offering to the trade the Koch Improved Hydraulic Brick Press, which, after several tests and exhibitions, has proven to be a big success. They claim that this is the only press manufactured which will make brick from all kinds of clay, soft, hard, shale or fire clay, under any pressure desired, and produce brick absolutely free from streaks or granulations. They are now making preparations to put their press along with the Grath improved double down-draft Kiln, on a yard of their own, where they intend to make only the finest class of face and ornamental bricks.

The Winkle Terra Cotta Co., St. Louis, has removed its office from 11th and Market Sts., to Room 47, Telephone Building, 11th and Olive Sts. The removal has caused some delay in getting out their new catalogue, but they will now give it all the attention possible, as the supply of their old one is exhausted, and they have had many requests for the new one. It will probably be gotten up in the half tone process, and will be a handsome affair. This company will furnish the Terra Cotta for the Famous and Knox building, and the St. Lou's Medical College. Both jobs will be in buff, the latter, a peculiar dark shade which produces a handsome effect.

Mr. Anthony Ittner's St. Louis yard which was destroyed by fire Jan. 2, has been rebuilt, and on Feb. 24th the first kiln after the fire was lighted. The capacity is the same as heretofore, and from his different yards Mr. Ittner is now shipping brick in all directions, North, East, South and West. The the force at the Belleville yards now all thoroughly understand their duties,

and all of the machinery is thoroughly adjusted to do its work properly; in other words, all the rough edges have worn off, and everything works properly and smoothly. He has some excellent photos of this model plant from which he is having engravings made for his new catalogue of pressed and ornamental brick, which will be ready for distribution soon.

Brick manufacturing interests seem to have centered at the junction of the Pan-Handle and South Chicago & Southern railways, just south of the city limits, two miles southwest of Hammond, says the Chicago Times. Trades are all closed for the following yards: J. B. Legnard and Ald. Madden purchased fifty-two acres and are constructing what will be the largest yard around Chicago; Wolff, Labahn Bros. & Wendel, of Lake View, have purchased forty acres and have started making machine brick, having been extensive hand-brick makers for years on the North Side; Charles S. Purington, of May, Purington & Bonner purchased thirty-seven acres, and will put up a model yard, starting with a capacity of 200,000 per day.

Mr. Jos. Fairhall, Grape Creek, Ill., writes that he has leased from the Grape Creek Coal Co., their entire brick and tile plant, which is now almost exclusively used for paving brick manufacture. They make one of the finest paving bricks in the United States, and have a ready sale for all that can be made. He intends to push the work so as to swell the output as much as possible during the coming year. He is running a Frey-Sheckler Giant machine and a Frey-Sheckler Acme machine. In connection with the paving material, they are making several sizes of paving blocks, which is repressed, using for this purpose one of the largest Frey-Sheckler power repress machines that have been constructed. Their output of paving brick is at present only about 50,000 per day, but he hopes to increase this considerably.

The Chicago Inter-Ocean is authority for the statement that Chief Robinson, of the machinery department, World's Fair, is receiving from the brick, tile and terra cotta manufacturers of the United States applications for so much space for exhibiting their brick, tile and terra cotta manufactures and machinery that he has concluded to ask the chief of construction if it is possible to obtain

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BOOKS FOR BRICKMAKERS.

It is pretty generally conceded that wonderful progress is being made in the ancient and heretofore unprogressive art of brick-making. Among the best evidences of this is the fact that the brickmaking craft is no longer without a literature of its own. There are now some good practical books treating on the manipulation of clay—the making, drying and burning of brick. The list is not so large but that every brickmaker can afford to have them all. Get them and read them.

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Prof. I. O. Baker, .25

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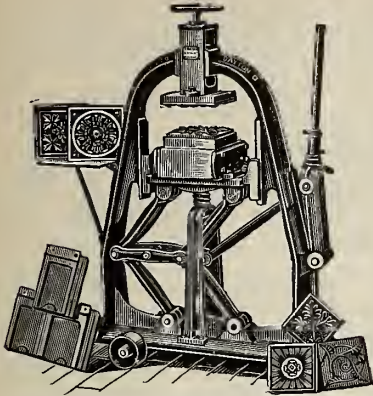
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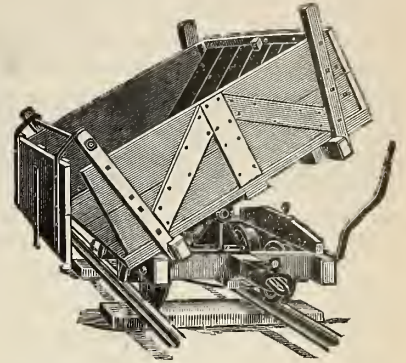


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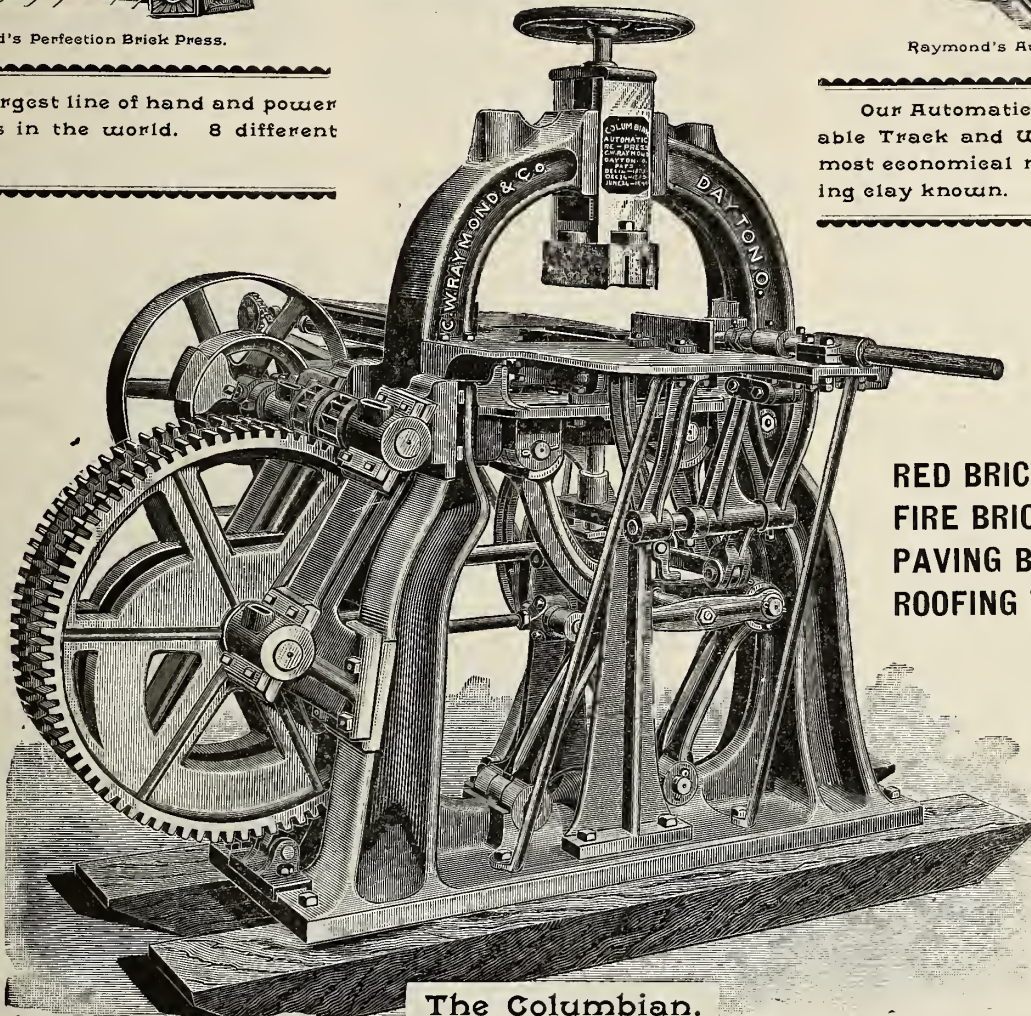
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PAVING BLOCKS
ROOFING TILE

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made on
the one
press.

Automatic Feed and
Delivery.

30,000 lbs. pressure

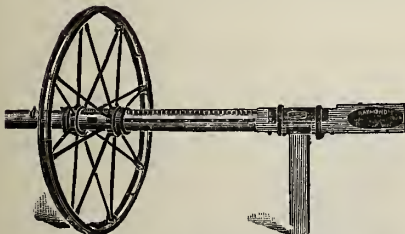
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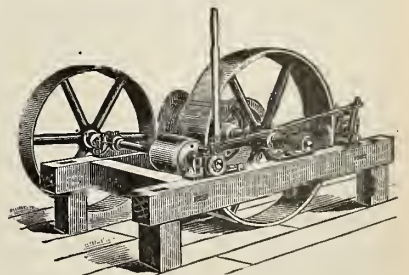
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DAYTON, OHIO.



Raymond's Wrought Iron Tempering Wheel



Self Contained Winding Drum.

space for a special building therefor. It is, of course, understood that as in the case of the leather exhibit, the manufacturers prominently identified with this interest will be called upon to raise the sum of money necessary to erect such separate building. These manufacturers desire to show the process of the making of tile, brick and terra cotta, but no decision has yet been arrived at. From this we take it that the clay machinery manufacturers will awaken to the importance of the matter in time.

Wm. Finnegan, of Ft. Howard, Wis., called at the CLAY-WORKER sanctum recently. He has been a regular subscriber since our first issue almost, and it therefore goes without saying that he is both a successful and progressive brickmaker. He has been making a tour of inspection among prominent dry-press works for the purpose of getting pointers as to the best press, etc. In this he succeeded beyond his most sanguine expectation, for every machine examined was proven the best ever built. He is now making brick by the soft and stiff-clay processes, and will probably add a dry press to his plant as soon as he can digest the information imparted by various manufacturers, sufficiently to justify a selection. While in our city he purchased a stock brick machine and equipment from C. & A. Potts & Co. It is his intention to increase his yearly output from six to twelve million.

IT'S DIFFERENT NOW.

It used to be thought a fortunate thing for brick manufacturers to have a large number of bricks on hand in the spring, but it seems that some of our Hudson river manufacturers do not think so any more.

THE SAME OLD STORY.

In order to make room for the various interesting communications from our special correspondents, and a few new "ads.," we are compelled to again enlarge the CLAY-WORKER. This number includes 110 pages and, we believe, contains much "meat." We hesitate to mention this evidence of prosperity, lest we wound the already lacerated feelings of our envious and misguided follower, but truth is mighty and must prevail.

A woman was never known to advertise for the return of stolen property "and no questions asked." She would ask questions or die.—*Texas Siftings.*

MAKE YOUR OWN APPLICATION.

Æsop's Fable of The Mastiff and the Curs.

It happened one day, as a stout and honest Mastiff, that guarded the village where he lived against thieves and robbers, was very gravely walking with one of his puppies by his side, all the little dogs in the street gathered about him and barked at him. The puppy was so enraged at this affront done to his sire that he asked why he did not fall upon them and tear them to pieces. To which the sire answered, with great composure of mind, "If there were no Curs, I should be no Mastiff."

THE RESULTS OF PRACTICAL TESTS.

C. W. Raymond & Co., Dayton, Ohio.

GENTLEMEN:—The New Columbian Re-Press we bought of you in January is the best machine we have ever had in the way of re-presses. We have no trouble in making 12,000 large size paving blocks in 10 hours and are highly pleased with the machine.

Yours Truly,

THE NELSONVILLE SEWER PIPE Co.,
C. H. Doan, Sec'y.

I never thought it possible that an Automatic Re-Press could be constructed to handle plastic material so perfectly as the Columbian does. We use five, are making building brick and re-press our entire output.

WASHINGTON BRICK MACHINE Co.,
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The Columbian Re-Press you placed in the Savage Fire Brick Works, at Hyndman, is doing nobly, pressing Silica Dinas Brick (98 per cent. Silica). We have used a great number of presses, but the Columbian is the only one that will handle these brick carefully and exert the necessary amount of pressure. We now make perfect silica brick.

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BARNUM'S PHILOSOPHY.

"If you have ten dollars to spend," said Barnum, "spend one for the article and the other nine in advertising it." The old man knew a thing or two when it came to advertising. Barnum said to me some years ago: "I can out-talk anybody on earth but the printer. The man who can stick type and talk next morning to thousands of people while I'm talking to one is the only man I'm afraid of. I want him for my friend."—*Ex.*

WANTED. Plans, specifications and bids for erecting a plant for manufacture of 75 tons of tile per day, from 3-inch to 14-inch size. Drying floor and kilns of the Wingard type preferred. Address

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CHESTER CLAY WORKING CO.,
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NOTICE.

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Tenders will be received by the undersigned until March 20th 1892, for the whole or part of the following assets of the said Company.

- (1) Stock of manufactured **Terra Cotta**, very complete.
- (2) Full stock of **Moulds** and **Models**, for use in manufacture of Terra Cotta.
- (3) Valuable plaster **Models** and **Cases** all mounted and in good order.
- (4) Stock of manufactured **Centre Flow-ers** and **Brackets**.
- (5) **Renewable Leasehold** property in the city of Toronto being Water Lot, having thirty three frontage on the south side of Esplanade extending to the Windmill line, nearly opposite Jarvis Street, with two kilns and buildings erected thereon, and boiler, engine, pug-mills, hand-presses and a variety of shafting, belting and pulleys.

The large **Four Story Building** and premises on the south side of the Esplanade being the Easterly part of the premises now occupied by the said Company, are **To Be Let** to a good tenant. Possession can be given at once.

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Full particulars regarding all the assets and property above mentioned can be had on application to,

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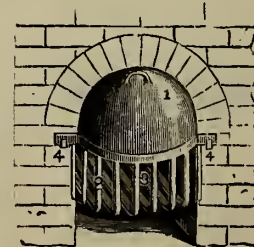
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In successful use for burning brick with coal in common cased brick kilns and down-draft brick and tile kilns without sub-arches or outside furnaces. For circulars and price address
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THE CLAYWORKER.

THE OFFICIAL ORGAN OF THE NATIONAL BRICK MANUFACTURERS' ASSOCIATION OF THE UNITED STATES OF AMERICA.

VOL. XVII.

INDIANAPOLIS, IND., APRIL, 1892.

No. 4

Written for the Clay-Worker.

A SPECIMEN OF GERMAN BRICK ARCHITECTURE.

THIS is the Fredericks Station in Berlin. It is near one end of Frederick Strasse. The picture shows two things of interest to brickmakers; one, a magnificent building constructed entirely of brick, and another, a clean street. The clean street is not of brick but it is nevertheless clean, and a clean street to those in a land of streets not clean, is a nice thing to look upon.

The station is of red brick. Certain of the decorative panels are in terra

cotta. The window sills, the foundation, the string courses and all parts, are in brick or some form of clay product. In the large gable there are shown beads surrounding the circle top openings. These beads are formed of brick of the ordinary size. They are molded in sections to suit the general profile of the bead. Recessing backward therefrom, there are very fine and nicely decorated recess moldings, so that altogether there is a delicacy, softness and fineness of decoration secured, not usual in any structure. A few such buildings with such brick work, such decorative effects,

in our own country, would mean a great deal to the brickmakers of America. Any want of refinement, or any want of delicacy of adjustment in brick work, is by the general public accredited to the brick and not to the designer, therefore, anything which shows extreme beauty and extreme delicacy, would reflect to the benefit of the whole brick industry. This gable with the many openings, is formed into a unit by the large, strong band of ornamental brick work which encloses all of the openings. The designer has shown his education, his knowledge of architectural design, by



RAILWAY STATION IN BERLIN, GERMANY.

making this surrounding molding, coarser, heavier and stronger than the other moldings which surround each particular window. By this vigorous treatment surrounding that which is more delicate, he is enabled to unify this part of his design. Here is one end of the grand front of the train house. In it is required much space for light and but for this tying together there would be a lack of strength and a lack of vigor which would not be in keeping with the dignity of so large a room. The little group of statuary on the top of this gable, aside from adding a distinct decorative interest, also gives an upward movement to that part of the design. If we look at the picture leaving out this piece of statuary, we can see that the building would look relatively much lower as well as much less interesting than it is. Thus we are able to see what a small feature, a small detail, may be able to do for an immense structure.

The lower part of this building, that which advances in front of the train house, is expressive in a general way of the uses for which it is intended. It is administrative in its character; vigorous, but not particularly large as compared with the other part. The fact that there are waiting rooms and offices in this building is made known in the character of the design. Thus, taking the whole composition together, we have the expression complete of an immense railway station. As the material leading to such an end, we have brick. The entrance is altogether dignified and consistent in appearance. As it advances it indicates its purpose, but at the same time it does not dwarf by its purpose or general character, the importance of the train station in the rear. We have expressed the idea that this is the entrance for the people, and back of it the train house, to which they enter or depart from, as the case may be. It is quite common in railway stations to have the entrance the great thing about it, and to draw the entrance and the train sheds into one feature. The architect in this instance has worked around the difficulty very nicely.

To depart a little from the brick and the architecture, and to take up that which is of general interest, it is well to invite attention to the street car rail which shows in the foreground of this cut. It is what is known as a V rail. Instead of having a flange on the rail, as is common, there is a groove cut into it. This groove is not sufficiently wide for

wagon wheels or buggy wheels to run into, and the sides of the rails are set flush with the pavement, and it in no way effects the convenience of travel on the street. In Paris one rail is usually left entirely flat, and the other with a groove in it. There is no obstruction to a street from having a rail of this kind on it. The only disadvantage of a street car line is the passing of the cars, which amounts to no more than the passing of other vehicles. L. H. GIBSON.

Written for the Clay-Worker.

HINTS ON BRICKMAKING.

No. 62.

BY. R. BRICK.

HOW TO CONSTRUCT A FLUE DRYER.

GRADUATE the foundation for the flues so that it rises twelve inches from the furnaces to the smoke stacks at opposite end. Let the flues open into a cross chamber at the stack end. This chamber must be as high as the top of the flues and extend downward twelve inches below bottom of flues. This allows any soot that is not drawn into the smoke stack to fall into this soot chamber, which is closed at each end so that it can be easily opened and the soot removed. This prevents soot accumulating in the mouth of the flues. It should be sixteen inches wide and covered with flat tiling or an arch of brick. Beginning at the furnaces the flues rest on a twelve-inch wall next furnaces, and four courses above grate level. At this point the flues receive heat from a distributing chamber, which joins them at right angles, into which the furnaces open to the opposite side. This distributing chamber should be sixteen inches wide and extend upward two courses above flues, and covered with a four-inch brick arch or fire clay tile. The outside wall should be at least eight inches, as upon this wall are built pillars that support the side posts of the building (if there are any posts in the middle for same purpose there should be an eight-inch wall under them). Next to this leave a space of five inches, then lay a four-inch wall four courses high, then five inches space and a four-inch wall alternately; then cover the flue with a well burned brick on flat, laid without mortar and close together. This will leave a small space between the ends of the parallel rows of cover bricks, which must be slushed with mortar to keep them in place. The four-inch walls are laid in clay

mortar. The first six feet of flue next furnaces should be of fire brick, also the inside four-inch wall of distributing chamber and furnaces must be of fire brick. The flue walls can be made of salmon bricks. The cover bricks must be hard. Distance from mouth of flues to the soot chamber 150 feet; width can be 24, 36, 48 or 60 feet as desired. One furnace is required for each twelve feet of width; seventy-two feet width gives three furnaces each for two smoke stacks. I prefer two stacks instead of one, and place them for a forty-eight foot or four furnace floor six feet from each side, or in the center of a line drawn from center of side furnace to smoke stack end. Furnaces should be forty inches wide and five feet long, front wall sixteen inches at bottom and twelve inches at top, measuring from foundation wall of flues, sixteen inches for distributing chamber, sixty inches for furnace and sixteen inches front wall, seven feet nine inches from flues to front line of furnaces, the ashpit beginning sixteen inches from front, should extend forty inches. This will give grate surface 40x40 inches, requiring grates three feet six inches long, ash pit should be at least six courses deep. This will make bottom of furnace ten courses below mouth of flues, and grates four courses below mouth of flues, and leaving a dead space of three feet from rear end of grates to mouth of flues.

There should be a four-inch wall across the distributing chamber each twelve feet, so each furnace is independent. If two stacks are used there should be one partition wall in soot chamber to make each stack independent. After flues are built furnaces should be put up, and smoke stacks also; these must be twenty-four inches square inside and fifty feet high, with a swinging damper in each. The rod on which they swing must come through the wall on the outside, so it can be operated when full draft is required let the damper swing vertically; if half draft, at an angle of forty-five degrees, or if no draft is required turn it horizontally, and fill up the flue. This should be placed four feet above the ground, so it can be operated easily. Stack must have a base at least nine feet square, drop off one brick each course until the base is reduced to six feet square; carry it up six feet high this size, then batter the corners three inches in each ten feet in height. At fifty feet the walls of stack will be eight inches. The

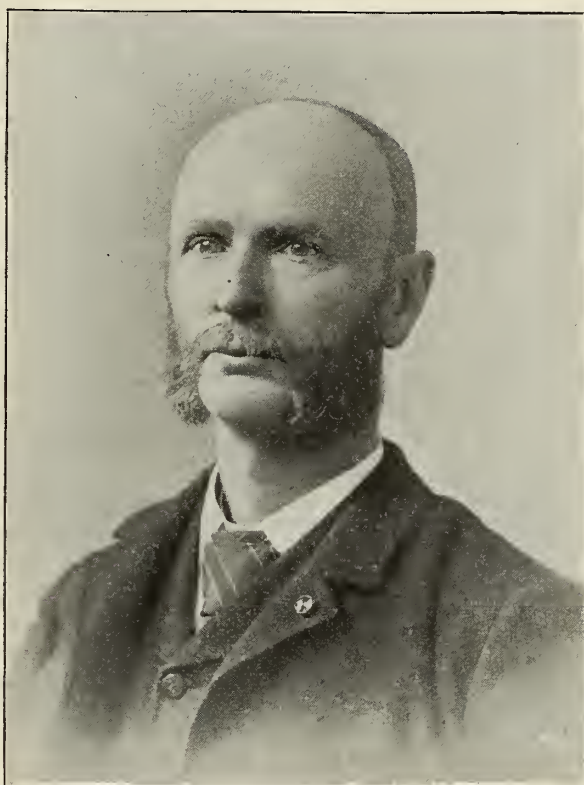
stacks should be built outside of soot chamber. A smoke passage connecting it with stack.

The building should be put up before the flues are laid, except the walls upon which the posts rest. At the furnace end the posts should rest on brick pillars eighteen inches above the top of the flues, and twelve inches at the stack end. This will leave the posts six inches above the hot floor when finished, and keep fire from the posts. After flues are built and covered with brick as described, cover them with tempered mud, soft enough that it can be leveled with a trowel. Water must be sprinkled on it, so it will polish under the trowel, following thickness beginning at furnaces, nine inches at the start, gradually reduced to eight inches; twenty feet from furnaces, seven inches; forty feet, six inches; sixty feet, five inches; five inches at eighty feet; four inches at 100 feet; $3\frac{1}{2}$ inches at 120 feet; three inches at 140 feet, and $2\frac{1}{2}$ inches at the end of the flue. The workman can use a guage with inches notched into it, and pointed. This he can plunge into the mud and keep the depth desired. Stakes can be set each twenty feet, with thickness marked on them. It is best to put down a section the whole length and just as wide as the workman can reach with his trowel. Soon as the floor is covered a fire of wood or coke can be built in the furnaces and the drying of the clay covering begun. As soon as the clay is stiff enough to walk over it must be rolled with wood or iron roller. This closes the openings caused by shrinkage. Continue this until too hard for the roller, then ram it with rammers made from 6x8 blocks twelve inches long, with a handle in one end. This will close the openings until the rammer makes no impression. Then dry it well. When all the moisture is driven out it will shrink no more. Then grout it thoroughly with this mortar, almost thin as water, so it will fill every opening to the bottom. If too thick it will close the top and leave openings underneath.

When it is dry and all cracks tight lay a "herring bone" pavement of smooth hard brick, bedding them in clay mortar instead of sand. Then sand the top as you would a side walk. Use wood or coke for fuel until the water

smoke ceases to come from the stacks, then coal slack can be used. The floor can be covered with brick soon as it is finished. They will dry slowly until floor is well heated.

One great drawback has been the filling of the flues with soot, and the trouble of cleaning them with swabs of old clothing drawn through by a wire. The last dryers constructed by the writer were built on the plan described. After they were finished a line of one-inch steam pipe was put in from the boiler to the stacks, a branch pipe run into the stack through the opening (that shall be left always at the bottom and closed temporarily), then turned upward into



S. K. FLETCHER, OF FLETCHER & THOMAS, INDIANAPOLIS, IND.

the flue of stack; when the draft is not strong enough to carry soot out of the flues, steam is turned into the stack and a strong draft results. This draws out all soot, and need be used but once or twice a month. A dryer built after this plan will dry bricks quickly and about as economically as any other. Don't build this dryer unless you build it right.

BEHOLD, fond man!

See here thy pictured life: Pass some few years—
Thy flowering spring, thy summer's ardent strength
Thy sober autumn fading into age—
And pale concluding winter comes at last,
And shuts the scene.

—Thompson.

Written for the Clay-Worker.

THE ADVANTAGES OF HOLLOW BRICK WALLS AND THE WAY TO BUILD THEM.

BY J. W. CRARY, SR.

IN previous articles I have recommended the construction of hollow brick walls to prevent dampness, and also the expansion and curving and falling by fire. All party walls should be built hollow. All the running courses, or *stretchers*, laid to the line, should be set off from the inside part of the wall three-quarters of an inch, and no *cross* joints should be in *heading* or cross band *headers*, excepting those on the outside, and every fifth *header* should be a *bat*, so that a free circulation of air can pass from bottom to top of wall. At the lower floor line of such walls small iron, or copper, or terra cotta screens, about 6x12 inches, should be set at intervals of eight or ten feet, so that air will freely enter the hollow of the walls, and pass up and out at top of the wall.

If a party wall between two buildings be built in the way I have above described, and one of the buildings burn, the heat will only penetrate through the first course of brick, it will stop at the aperture next the *core* or inside part of the wall, and there will be sufficient flexibility in the *band* courses to allow the *shell* of the wall to expand without curving the whole body of the wall. Many party walls bend and overhang during a hot fire against them, so that they fall, or else are so much out of line and damaged that they are unfit for future use. It would be best and economy in the long run for all party walls to be lined of brick that would stand fire well, adding one fourth of fire clay mortar to the mortar used. All party walls, or long walls of any kind should be supported laterally by *pilasters*, unless there are cross walls or abutments of some kind at close intervals. A wall three brick thick, with a four inch pilaster, $8\frac{1}{2}$ inch face, at intervals of ten feet, will stand as much lateral pressure as if it were a wall four brick thick without pilasters.

HOLLOW WALLS FOR DWELLING HOUSES AND THE WAY TO BUILD THEM.

I said in my last article on this subject that I might give a diagram of a building with hollow walls, as I have

proposed, but as it would occupy too much space in this article, and as I can make a specification sufficiently clear to a bricklayer or builder, I will dispense with drawn sections of my plan. All builders understand that when a plan is drawn for a brick house, the windows and generally the doors show one above another, so that a line drawn plumb, through the center of each opening, would show an equal space between them all the way from first to upper story. Now we will suppose that you are ready for the ground floor joists, you will take your ground plan and lay off the spaces for your doors and windows from center to center of each opening, then take half the width of the door or window from the center and for the return face of the *jamb*, which should project four inches from the inner line of the wall and have $8\frac{1}{4}$ inch face, and at this point start the foundation of pilaster on each side of the doors and windows. Carry these pilasters or jambs all the way from bottom to top of the wall. This shows a panel between the doors and windows inside of the room, which gives relief to the straight unbroken surface between openings made without projected jambs or pilasters, besides adding one third to the lateral strength of the wall. An eight and a quarter inch thick wall thus built with pilasters is as strong as a brick and half, or what is called thirteen inch wall without them.

TO MAKE AN $8\frac{1}{4}$ OR ONE-BRICK WALL HOLLOW.

There are two ways for making hollow walls. One way is to start the inside course of brick flat, three-quarters of an inch from the outside course; this leaves an aperture of three-quarters of an inch between the two courses of brick, and in the center of the wall, if it be only an $8\frac{1}{4}$ inch wall. A wall built in this way would show a recess of three-quarters of an inch at every band or heading course, which can easily and quickly be *flushed* with mortar, as the bricklayer proceeds with the work.

If this way of making an air space or hollow be preferred, it answers the purpose for keeping the inside of the wall dry, and plastering can be put directly on the brick, and the wall is strengthened by it, and is as dry as if *furred* and *lathed*. Dampness from the outside can never penetrate further than the three-quarter inch air space, and the room and expense of *furring* is saved.

Another, and I think the best, way is

to set the inside courses of brick on edge. This plan leaves a hollow air space of $1\frac{3}{4}$ inch, and saves 20 per cent., or about one-fifth, in brick. If we add the brick required to build the pilasters, as a rule, the saving of brick would be about 17 per cent. If brick be full four inches wide, two courses on edge, with mortar joints, would raise the wall about nine inches. If brick be $2\frac{1}{4}$ inches thick, three courses on the *flat*, with heavy bed joint, would raise the wall nearly nine inches, so that a band *header* could be laid every fourth course. I have run two courses on edge inside, and then a *header*; and have run three edge courses and a *header*. Either way will make a good strong wall, and may be done to suit the width and thickness of the brick, but in all cases where *band headers* are laid every fifth one should be a *bat*, so as to leave the hollow, or air, space free and clear from the ground floor to the top of the wall, which should be covered with *copeing*, with proper air spaces left under it, so that a free circulation of air will be had from the ground floor, or line of the wall, to the top of it. In building hollow walls care should be taken to prevent mortar from flushing out of the joints, so that the open joint spaces between *headers* will not be filled with mortar, and thus prevent the free circulation of air.

ALL WALLS WILL MORE OR LESS ABSORB DELETERIOUS POISONS.

It is a fact not generally known or thought of that the walls of houses, composed of porous substances, will sooner or later absorb malarious poisons. Brick, wood, plaster or paper will become, according to condition and circumstances, saturated with matter deleterious to health, hence it is a matter of prime importance to so construct walls, floors and ceilings that at proper times they may be cleansed or fumigated, so as to destroy or neutralize all noxious matter. If walls were built hollow as I have suggested, and metallic or terra cotta grates set in the wall at the ground floor, the interior as well as the exterior part of the wall could be readily cleansed at any proper time.

ECONOMY, COMFORT AND HEALTH IN BUILDING HOLLOW WALLS.

If it is desired to have a wall seven-teen inches thick, by building the pilasters as I have suggested, the same strength is attained by building a thirteen-inch wall. If a thirteen-inch wall is proposed, a nine-inch wall with pilasters will be just as strong, and if built

with the inside course on edge, 17 or 18 per cent. of brick is saved, besides the mortar. Besides, the *furring* is dispensed with, which saves room and cost, prevents the burrowing of bugs and mice, and adds solidity and strength to the wall.

PAVING BRICK IN TEXAS.

The city engineer of Dallas, Tex., has obtained specimens of paving brick from different parts of the United States, and is giving professional attention to that material as a substitute for bois d'arc. He thus expressed himself to a News reporter recently:

"I was very much interested in the article in The News on paving brick and paving brick material by Prof. Dumbler, the State geologist. I have given the matter of paving material consideration for a number of years, and, having at one time been interested in brick manufacture, have tested different varieties of clay, with the view of finding some suitable for paving purposes. I got satisfactory results from a shell clay, of which there is a great abundance both west and north of Dallas. It produces a paving brick very similar to that mentioned by Prof. Dumbler as being made at Fort Smith, Ark. There is no question but that good paving brick can be made here, nor is there any doubt but that brick or asphaltum will make a smoother and more satisfactory street than bois d'arc, especially in the residence section of the city. While not quite so cheap as macadam at first, either material, when the cost of repairing macadam streets is considered, will prove cheaper in the end."

NOT AN EXPERIMENT.

In a letter on Brick Pavements, Mr. Robert Alexander, of Portland, Ore., says:

"Brick is not an experiment for street paving. In Europe they have been used for a century at least. In Holland especially brick pavements are used very extensively. Amsterdam is paved almost entirely with bricks, and with common hard building bricks at that. The street running from Utrecht to Gonnighem is twenty-seven miles long, and it is paved entirely with bricks. The wear and tear on the business streets of Amsterdam is probably ten times greater than it is in Portland, and yet many of those brick pavements have been down over fifty years without showing any great signs of wear."

STATE CONVENTIONS.

A Plea For Better Attendance.

THE thing uppermost in my mind to say at this time, is, in regard to the attendance at our annual meetings. In this State alone, there are somewhere near five hundred tilemakers, and the "dear knows" how many brickmakers. But I would say that there is more brick than tile makers. So, to be safe, we will say, that there are at least one thousand of both classes.

The number in attendance at any one meeting, I think, has not exceeded one hundred, or one tenth of the whole number, excepting a few meetings following the organization of the Association. There are some here to-day who have attended these gatherings regularly from the beginning, and I think it is safe to say they have been benefited on the whole more than it has cost them in time and money to attend. Some of us have been making tile or brick for fifteen or twenty years or more and yet we are ready to confess that we don't know all there is to be known in the business. The American people are a progressive people, and if we expect to keep up with the procession we must be alive and wide awake.

Americans are of an inventive turn of mind. And while you sleep, and dream of the fairy land, and what a harvest you will reap,—deep in thought, some other mind, will have surpassed you ere you wake, to your coveted selfishness.

A few years ago a veteran tilemaker said to me: "These conventions are curse to tilemakers, they are run for the good of the clay journals and the machine men."

Now this is selfishness, pure and simple. We cannot well do without either. Both the clay journals and machine men have been of great benefit to the Association. Why not accord to them equal benefits with ourselves of these associations?

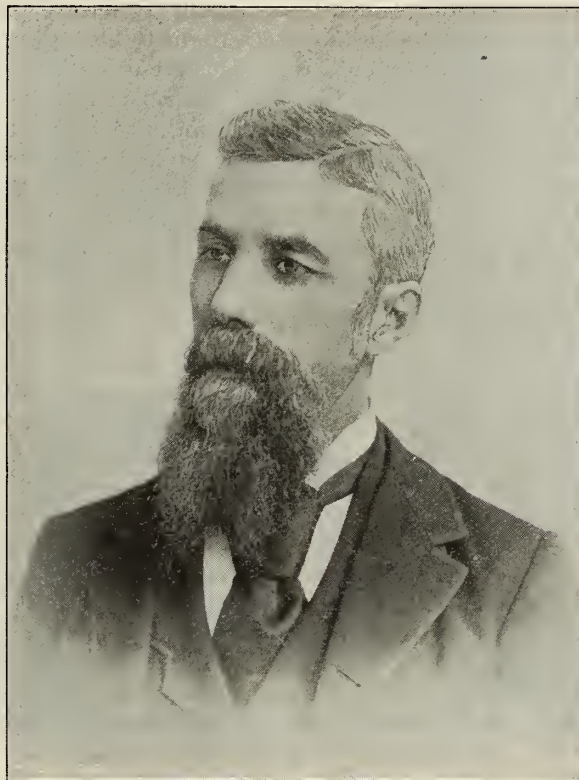
Gentlemen, this is a broad country, as you all know, and we will have but a short time to stay in it, and while in it let us cultivate a brotherly spirit; the world will look brighter and we will be happier.

Our coming together, our contact with

each other, our interchange of thought and experience, will brighten our ideas, advance our interests and increase our usefulness.

Mr. Eudaly, your worthy ex-president, in his address last year, reviewed the work of the Association, what it had done in disseminating knowledge in the past, the advance that had been made, the high character of the papers read at each annual meeting and the future full of promise.

Gentlemen, I know you do not intend this Association to take any backward step. These annual gatherings will be of interest and profit to us in proportion to our ability and willingness to



J. W. EVERAL, PRESIDENT OHIO TILE, BRICK AND DRAINAGE ASSOCIATION, WESTERVILLE, OHIO.

make them such. We hope to see the membership of the Association increased each year until the tile and brick fraternity of the State will have been enrolled with this Association.

Now, gentlemen, with these very few words, I only wish to add: I hope each member will feel free to take part in the discussions. If you have a "bit" of practical experience on any subject under discussion avail yourself of the opportunity and let it be known. An ounce of practical experience is worth a pound of theory.

Beware of the vicious man who proposes to reform his life on the installment plan.—EX.

Written for the Clay-Worker.

GOOD COUNTRY ROADS.

BY BRIX.

THE New World began to quicken and pulsate with life and energy soon after the introduction of the iron horse and railway. Our country's growth was spontaneous, not gradual; and the new conditions thrust upon us from time to time took us away from, rather than toward, a better state of our highways.

The railroad came not to supplant the already established turnpike and toll roads of England, but rather was brought forth at a time when the world was travelling in the pangs of labor.

Invention and mechanical genius had been lying in embryo. The vigorous infant gave promise of gigantic growth, which has already been more than realized, and for a time succeeding its advent the common wagon road has fallen into neglect. This is more noticeable in the United States than in the old settled countries of Europe, whose turnpikes were well paved for many years prior to the introduction of the iron rail, or tramway.

The old days of stage coach journeys laid a tax upon the people who lived adjacent to the line, which kept up that particular road. The branch roads from or to it, in many cases, were mere bridle paths, or blazed tracks or trails. Even in the older settled portions of the New World a three days' journey of less than one hundred miles was a season of torment to the traveler. The railroad came and did nothing to better the condition of our wagon roads, and much to break up and wear out such roads as already existed. In many cases the roads of a particular place can date their decay to the advent of the railway.

The building of the railroad entailed a heavy traffic along its entire length, which broke up and ruined comparatively good dirt roads that were in existence previous to its advent. Because of its rapid and easy mode of conveyance and travel, railroads were patronized and fostered, and the wagon roads fell into neglect and disuse, until our country roads are to us a byword and reproach. Travel by wagon has decreased and increased by rail.

Our road laws were enacted in the

Annual Address delivered by J. W. Everal, President of the Ohio Tile, Brick and Drainage Association, February 9, 1892.

callow days of our nation's early history, and there is no evidence of the wisdom and discretion displayed in their framing, which characterizes our people in the making of States. In most States the laws remain almost as passed upon, without alteration or amendment. Made to suit a pioneer people, rather than a well established government, backed up with a century of progress and achievement. Outside of our incorporated towns and cities, the roads are principally kept up by a tax upon the able-bodied male citizens between the ages of eighteen and fifty, which requires them to give of their time, or a substitute, not less than one day, nor not to exceed, in some cases, *thirty days* each year, to work on the roads of the district in which they live. This law prevails largely in nearly, if not, all the States, and is, perhaps, more strictly enforced in the Southern States than any other law on their statute books. This being the only collection made of taxes against the negro, who is a citizen and a tax payer. Many are the expedients resorted to by poor whites, negroes and young men of all classes to avoid road work.

This tax is severe and unjust. Its collection is uncertain. The greatest objection to this plan of road work is the public fails to get value received for the amount of the expenditure.

Again, there is not a young man of eighteen years of age, any place in this country, who, if he has ordinary good sense, will willingly or cheerfully pay this tax. He may spend one day, or perhaps two, with his neighbors, working the road, more as an annual gathering than to repair the highway. After that his work is pefunctory; he does as little as he can, and cares but little how it is done. He recognizes a class distinction in the tax levy, and is dissatisfied. It is enforced labor unrequited. The writer worked the roads as a substitute before he was sixteen years of age. Since that time he has seen his own sons called upon for their taxes, and they sent substitutes to work in their stead. This, too, when they had just passed their eighteenth year, and were students in school.

The gang of workmen repairing the road sees the old farmer or villager pass and repass them, and are quick to note the fact and remark that the "judge" or the "squire" are the ones who use the road the most, and do the least to keep it in repair.

THERE CAN BE NO GOOD ROADS WITH SUCH POOR LAWS.

The remedy we would suggest is to first abolish the law which requires a man to work the road, and in its stead assess a tax equally upon every voter over twenty-one years of age. This, in addition to a property tax of liberal amount, to be applied to the building of highways and bridges, in such manner as may be determined best—either by contract or by day labor—and always under the supervision of a responsible board of State and county officers. In addition to this, let all leasing of convicts be abolished, and instead of bringing them into competition with free skilled labor, as is now done, both inside the penitentiaries and out of them, let all the convicts and criminals, both State and municipal, except those sentenced for life, be put to work upon the highways, under ball and chain, attended by guards. There being at present but little free or paid labor employed in road making, brings the convict into competition with no large or important class of laborers, as at present, and opens new avenues of trade to skilled free labor.

If two, three or more States were to act together in harmony regarding their road laws, each instituting a Bureau of Road Improvement, whose duty would be to procure and disseminate information on road construction, giving details of kind of materials, cost, durability, care of roads, grades, etc., and carry out some such plans as has been here foreshadowed, there would occur the most wonderful rise in values in farm property. In fact all real property in those States would outdo all the booms or land speculations of the most visionary speculator. This would result naturally, because, first, the aforesaid tax would remain in the hands of the working people as wages.

Again, we would have all our principal roads brought to uniform easy grades, and paved in from eight to ten years. All cross and by-roads would receive attention equally, when the case was equally important. All roads could not be improved immediately, nor could all be benefited first. A beginning must be made some place. The details of the doing cannot be shown up in this short article. We are only pointing the way, and "in the multitude of council there is wisdom."

The cities of this country have all had, or are having, their period of agita-

tion on account of the how and where-withal in street improvement, and it is perhaps best that we look to them for examples, and weigh well the evidence in favor of this or that material and method of street paving, they having tried nearly everything available for roadways, and are prepared to give us a verdict for or against it. The streets of a city are its most extensive and expensive improvement. Because of the large and varied property interests abounding abutting upon the streets, they have been the prime cause of more political jobbery than any other one item. The same danger confronts us in the location and building of country roads, and requires wise management to secure routes, grades, etc., so as to secure the most good to the public concerned.

The past twenty-five years has witnessed a complete revolution in street paving, both as to the manner of construction and kinds of material used. There have been several candidates for public favor in this line, each having points in favor of or against it. Macadam (so named from its projector), which is crushed rock laid on the roadway in heavy bed and solidly packed or rolled and made level with a smooth even surface, has been more largely used than any other material; probably because of the abundance of rock suitable for the purpose, lying contiguous to our cities and roadways. In many places inside the city limits, where streets required a heavy grade, rock enough has been taken out to pave a great part of the road bed.

Wooden blocks, both round and square, sawed to length and placed on end in such manner as to form a smooth level roadway, have also been used largely for city streets. This makes an easy, noiseless road, but has the disadvantages of being absorbent of liquid filth, and consequently unhealthy. It is also perishable, as even the best of timber, when put in the street, soon becomes rotten and is undesirable as a paving material.

Asphaltum has been used very extensively, with the points for and against it about evenly divided. We believe if it had to rely upon its merits alone, instead of its financial backing and advertisement, it would long since have been discarded as a paving material for street purposes. It is smooth, elastic and noiseless when new, but is likely to be broken into unsightly and dangerous holes, that are difficult to repair. It is

very undesirable as a pavement or sidewalk, because of its inconvenience in taking it up to put in gas or water pipes, wire conduits, street car rails, etc., and making it as good as before breaking it.

Granite block are next to the best known material for roads, but granite has several serious objections. First, its extreme cost. Granite quarries are not in reach of most of our cities, and long-distance hauls adds to the cost in freight bills. Again, granite blocks wear smooth

term. They wear better than granite, are not susceptible to polish, wearing velvety, which gives a firm foothold to horses. The roadway is readily repaired and made whole as when new.

When our country roads shall be made of bricks, and properly put down on well constructed road beds, the brick industry will be the next greatest of all diversified industries. Agriculture alone would compete with it in numbers employed, or its hundreds of millions

and silent at night, while the workers in the great human hive would go forth to gather new stores of strength and happiness for the coming day. This is the true source of our country's wealth. The comfort and happiness of its people.

A BRICK PAVED CITY.

The accompanying illustration is from a photograph of a part of Market St., the principle thoroughfare of Steubenville,



PUTTING DOWN A BRICK PAVEMENT.

with the traffic of the streets, and horses are liable to slip and accidents result.

The material which we wish to call attention to, as the coming material for good roads, which embody more good points in its favor, with less disadvantages than any of the others named, is brick or street paving blocks, of burned clay, now coming into prominence as vitrified bricks. This name applied to paving bricks is a misnomer, should be discarded, and some other more appropriate substituted. We have not space to more than briefly refer to the materials used, and advantages claimed for each. Brick streets are smooth, clean, almost noiseless, non-absorbent, imperishable in the ordinary sense of the

of capital invested in the business.

The stimulus given to all branches of trade bearing on the manufacture of bricks would employ millions of our people at highly remunerative wages for many years. Agriculture and rural life would receive added charms and new adherents. Our urban population would become largely suburban or more rural, with good roads, rapid transit easy and inexpensive modes of conveyance, put the rural resident nearly on the same footing as the city resident. The country resident would go to the city to do business in trade and barter, returning by one of the four or five means of easy travel. The city becomes the office and workshop by day, which would be empty

Ohio, as it was being paved with fire brick. This city has obtained a national reputation for its fine streets.

The first brick street pavement was laid during the summer of 1884, one square, and it is to-day as smooth and solid looking as any of the others, which is quite remarkable, inasmuch as when it was put down it was in the nature of an experiment, and a new business for the contractors, together with the fact that the material was just hard mill fire brick, while the brick now used are much harder and made especially for paving.

Since 1884 there has been about twelve miles of fire brick pavements laid in this city, all under the immediate and

most efficient supervision of Mr. J. Mortimer Barclay, the city engineer. Mr. Barclay prepared the first specifications for this plan of street improvement.

This city is most advantageously located for securing paving at a low figure. Lying on the Ohio River but a few miles from the many paving brick works. The material is brought in barges at a very low rate for transportation. The prices for paving the various streets have ranged from 65½ cents to \$1.19 per sq. yard. Some of our streets are naturally of gravel; then no foundation is required. The bids have generally read "with or without foundation," about ten cents per square yard additional being charged for foundation.

The paving of a street with brick is rather an interesting operation, and the workmen are always sure of numerous spectators at any stage of the work. The street is first plowed with an ordinary plow and excavated to a depth as designated by the engineer, so that it will have the same convexity as the pavement when finished. Gravel is then put on in a sufficient amount, so that after being rolled by a seven-ton roller it will have the specified depth, usually about six inches. The gravel foundation is then covered with about two inches of sand. This is leveled by means of a lute sliding over two skids. The skids are so placed that after the lute is pulled along them it leaves the sand ready for the brick to be laid. A boy sits on the lute and his weight prevents it from jumping and making the surface thus passed over uneven. In the photo you will see the men arranging for another leveling with lute. This is repeated till all the sand is smoothed. The bricks are inspected by persons selected by the property owners, and soft and defective ones thrown out. The bricks are laid on edge lengthwise across

a seven-ton roller and covered with two inches of sand. The pavement is then complete and ready for use.

The convexity of the pavement varies according to the width of the street.

Market street, which is thirty-six feet wide, is eight inches higher in the center than at the curb, thus forming its own gutter. The photograph was taken in August, 1891, and eight squares of that street were paved on that contract, the price being 88 cents per square yard. This included the tearing up of the cobble stones with which the street was formerly paved.

That brick pavements are a success in this city is self-evident. They have replaced cobble stones and locust blocks on several of our streets. Streets have been paved every season since 1884, and no repairs have been found necessary, except those occasioned by that noted vandal, the plumber.

Fire brick has been used exclusively except for a short distance on one street, where a prominent brick manufacturer has paved in front of his own residence with shale brick of his own make. They apparently stand the wear and tear very well.

The pavements are paid for by charging 49-50 of the cost to the abutting property and 1-50 is placed on the general tax duplicate. The payments are made to cover five years, and a liberal discount is given for cash.

An additional feature, which would have enhanced the photo's value, would have been the stalwart figure, in the foreground, of City Engineer Barclay, to whom our elegant streets are largely due.

JOHN L. MEANS.

Steubenville, Ohio.

A SEVERE TEST.

The street committee of New Haven, Conn., in order to test the hardness of

pounds, but the weight of the brick was not lessened. Other tests were made afterwards with practically the same result.

BRICK PAVEMENTS.

A Sanitarist's Views.

Office Secretary Board of Health.

(Copy)

BALTIMORE, December 12, 1891.

EDWARD STABLER, JR., ESQ.

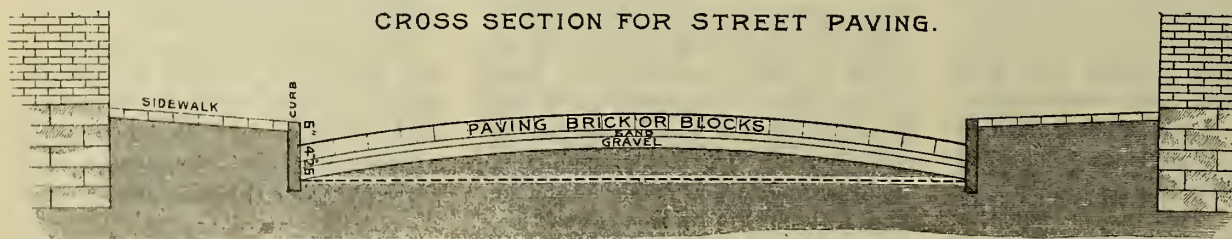
DEAR SIR:—I have your favor of the 10th inst, asking my views from a sanitary standpoint, as to the effect of improved pavements upon the health of the community, etc.

There are, in my opinion, but few improvements that could conduce more to the general health and progress of our city than well paved roadways, including alleys.

As to the best material to be used in replacing the cobble stones, which cover most of the streets and alleys in the city, that is a question that belongs more properly to the department of civil engineering, due reference, of course, being had to sanitary conditions.

Wood is always objectionable, from a sanitary point of view, and objections have been found to the Belgian block, from the fact that the bed of gravel and subsoil, in which it is laid, generally becomes polluted with organic matters derived from the excrete of animals, which, in hot and dry weather, gives rise to offensive and dangerous gases. An ideal pavement is one which admits air to the soil beneath it, and at the same time prevents any leakage into the ground of liquid filth. Without being dangerously smooth, it should be of even surface to insure cleanliness and yield sufficient elasticity to prevent injury to vehicles and animals by distributing the weight and shock evenly

over the surface, and lastly, it should be of material sufficiently durable to offer necessary resist-



CROSS SECTION FOR STREET PAVING.

the street. Any ordinary laborer does this, no particular skill being required. After this a thin layer of sand is scattered over the pavement and swept into the interstices and then rolled with a light roller, and any defects then remedied. It is then thoroughly rolled with

vitrified brick, had three bricks and eight or ten pieces of pig iron (185 pounds) placed in a rolling barrel which was revolved for five hours, making twenty-eight revolutions per minute. When the barrel was opened it was found that the iron had reduced two and one-half

ance to heavy traffic and to resist alike the action of frost and sun.

From my observation of the vitrified brick pavement in Europe, I am inclined to think that this material fulfills, more nearly than any other yet tried, the above conditions, but it should

be remembered that the excesses of temperature in this country are much greater than in either Belgium or Holland, where vitrified brick is most used. How far this circumstance would tend to modify the application of any material to paving purposes, I am unable to say.

The asphalt pavement has many advocates, on account of its elasticity, cleanliness and even surface, but the last word has not been heard on the sanitary question involved in the use of this character of pavements for streets and court yards, where the subsoil is reeking with filth and pollution, and more particularly in a city where one twentieth of the built up area, exclusive of highways and parks, is occupied by leaching cesspools. It cannot be denied that the asphalt pavement, which admits no air to the interstices below it, will destroy normal bacterial life in the soil and thereby prevent the so-called self-cleansing process of the ground, which, in large towns, is always more or less permeated by impurities derived largely from leaking sewers and cesspits. Thus the germs of disease are collected, as it were, in a Pandoras' box, to be drawn through foundation walls into the living and sleeping apartments of our home. It may be regarded as a sanitary truism that air cannot be excluded from the polluted subsoil of a large city without disastrous results.

In the city of Paris, where asphalt pavements exist on most of the thoroughfares, typhoid fever has prevailed in an epidemic form for many years and diphtheria is greatly on the increase in that city. Very truly yours.

(Signed) C. W. CHANCELLOR, M. D.
Secretary State Board of Health for Maryland.

Written for the Clay-Worker.

GLAZED BRICK.

BY THE ARCHITECT.

I WAS talking a few days ago to one who knew something about glazed brick. He said: "We had a pottery kiln; we were making jugs, crocks and ware of that character, and business was a little dull. A few miles down the road we had a brick kiln, and while we had little trouble in selling our hard brick and fronts, there was a big kick on about the soft and salmon brick. We couldn't get rid of them. It occurred to us that we could reburn some of them, but we did not have the opportunity at our

other kiln. Some that were rejected in the city we found more convenient to send to the pottery kiln. Particularly was this true because the market for jugs and crocks was not particularly good at that time. We put the soft brick into a pottery kiln where we had been using a salt glaze, and the result was altogether satisfactory as well as interesting. We got what is called a reflex glaze. The salt which had been used for the pottery had, of course, glazed the inside of the kiln. When it was heated again that glaze was communicated to the brick which it contained, and we had a very beautiful lot of re-burned brick with a reflex salt glaze. We took them to the Builders' Exchange and showed them to the buyers there, and they thought they were a vitrified brick. We were able to sell them, however, with a knowledge of their real character, as pavers for \$9 a thousand. Considering that we had no market for them before, the result was altogether satisfactory."

I said to this brickmaker that there is a demand for glazed brick; that all he had to do was to make a few of them and get the sale started. He said:

"There is an enameled brick which is sold from Philadelphia and New York."

I told him I did not mean an enameled brick. Enameled brick cost too much money. What is wanted is a glazed brick; a salt glaze or a cheap glaze; something of moderate cost, yet impervious because of the glazed surface. I asked him what he could make a brick for and sell it at a good profit the same color and general texture as a glazed crock. He said three times the price of ordinary building brick; that this would afford a good profit, and in a short time pay a man for the extra trouble of arranging to do that sort of thing. He asked me what I would do with this sort of brick. I told him that I would build foundations for frame houses.

"Why that?" he asked.

"Well, a glazed brick foundation would be utterly impervious to moisture; it could not be rendered foul by any means; nothing so dirty could be piled against it but that it could be readily washed off; moisture would not crawl up it. Altogether it would be quite as satisfactory as stone."

"What would the extra cost be?"

"Not great," said I. "Let's figure a little. Take a frame house thirty feet front and sixty feet deep. That would be a hundred and eighty feet around.

Say there were two feet of brick work above the grade. That would make three hundred and sixty superficial feet. At seven and a half brick to the square foot it would take twenty-seven hundred brick. Now if even twenty dollars a thousand were paid for these brick the cost would be fifty-four dollars. If common brick cost say one-third of that, it would make thirty-six dollars extra for the cost of glazed brick for the outside foundation surface of a frame house. It may be assumed that the labor would be the same. There is no reason why it should cost more to lay them."

Then the question of different kinds of glaze came up. This clayworker, who is a manufacturer of brick and pottery, said that the grey brick, the stone ware with the salt glaze could be made at the figures which I have mentioned and sold at a large profit. "But," he asked, "where will you use them?"

"Where would I use them," I asked. "Where would I not use them? Certainly they are cheaper than pressed brick for a store front, and certainly they are better. What could be more beautiful or satisfactory than a salt glaze brick the same color as stone ware? What could make a more enduring or more satisfactory material for a store front? What more beautiful in color or more artistic? What would reflect the light better? What more clean? Take, for instance, a cheap tenement which I have in mind to build for one of my clients. I would line the stairways, the halls, the water closets, the pantries with these stone ware brick. Make something neither time nor exposure could effect. Something which would always be clean. A moist rag passed over it purifies it. It does not depreciate. It is not like plastering that is nicked, or that may become contaminated by foul surroundings. Washing makes it clean at once. The foulness of a century could be washed off in a minute. A glazed brick is an emblem of purity as far as building goes."

"Are there glazes," I asked, "which could be used other than the salt glaze?"

"O, yes," he said, "various dip glazes?"

"What is a dip glaze?" I asked. "Being only an architect, I cannot, be expected to know everything."

"Why, a dip glaze is a dip or paste of clay in which the brick or crock may be dipped. The character of the clay is such that it will melt at a lower temperature than the brick or other bit of

clay which it surrounds. Hence, it forms a glaze. With this dip one gets various colors. There is the Albany dip which makes a brown glaze on a jug or crock. It will do the same thing for a brick."

"Can you get other colors of salt glaze?" I asked.

"O, yes, that depends on the character of the clay. Some clays burn naturally light and grey. Then if one gives them a salt glaze the natural color of the burned clay effects the color of the glaze. Clays which burn red or brown effect the color of the glaze in the same way, so that one may get a variety of colors not alone by the use of dips, but by the colors of clay in combination with a salt glaze. We sometimes use salt which has been once used in curing meat. It is quite as satisfactory and a good deal cheaper than anything else."

From this our conversation went to the matter of prices, and he asked me, as an architect, why he could not make these glazed brick and charge a good big price for them. I told him that he could, of course, if he wanted to, but I did not believe he would make much money in this way, as if he sold them at a moderate profit. There would be a great many more of them sold, their uses would be infinite, the market would become more rapidly enlarged if they were sold at a moderate price than as an article of luxury.

I asked him if he did not find it a more difficult matter every year to sell his soft brick.

"Certainly I do," he said.

"Can you not re-burn these soft brick and make them into glazed brick?" I asked.

"Yes, we have done that, as I explained to you before."

"Then why not continue to do it? You would make a much better profit on them than if they were re-burned or sold at their market value as ordinary brick."

I write this for the CLAY-WORKER because of the strong fight I see you have been making for glazed brick. Of course we all know we can get the enameled brick by paying a big price for them. However, most of the building that is done in this world is done by people of moderate means. Few people can afford to pay for enameled brick. At least they think they cannot. They look upon them as luxuries, and as you have said before in your editorials, if the entering wedge can only be made with the salt glazed brick, something that has about the same glaze as a jug, sewer pipe or a piece of crockery ware, in a short time nothing else than glazed brick, enameled brick and other impervious building material of like character will be thought of. Certainly nothing can be better for a store front than a brick which has the same character of surface as a piece of sewer-pipe. The color is rich and varied. As you have said before, all that is needed is the supply to create the demand. If you can only push this matter forward, bring these brick into market, you will be entitled to the thanks of the entire architectural profession. You, as a journalist, will get the thanks, and the bricklayers their reward.

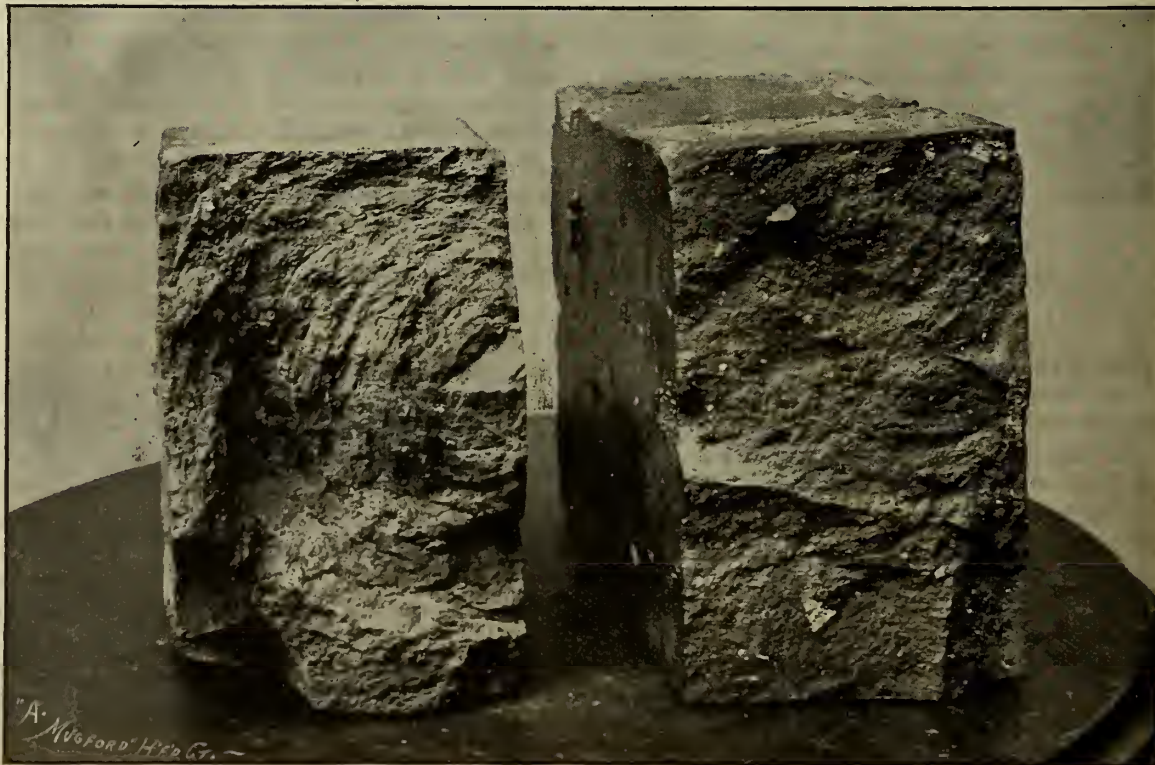
Certainly as soon as the practice of making this kind of brick becomes general, the methods will improve, the colorings will become more varied and the results generally more satisfactory than

at first. However, I wish to say that, as an architect, all I want is a glazed brick, something impervious. I do not care if each brick in a thousand has a different color, and if there are varying shades from end to end of each brick. The glazed brick is impervious. It cannot be fouled. The general coloring will be beautiful, and altogether their introduction will contribute to better building, than which nothing can be more satisfactory.

LAMINATIONS IN STIFF CLAY BRICK.

The Auger or Stiff Clay Machine has created a greater revolution in the brickmakers' trade, than any other process that has been introduced by the craft.

This process has made it possible for good, strong brick to be made of very poor material. All clay that will make hand made brick will make much stronger brick when made with a stiff clay machine. Many kinds of clay that cannot be made into brick by the hand or dry clay process will make good brick by using the stiff clay machine. For these reasons this style of machine has become very popular and has, in many cases, superseded all other methods of brickmaking. Thousands of these machines are now in use in different parts of the world. Many large establishments are taxed to their utmost



capacity to supply the demand for that class of machinery.

Nearly all brickmakers who have been pioneers in the introduction of this process will always remember the objections that have been made to the use of brick made on auger machines. One of the main objections has been the laminations in the brick, and that is about the only reasonable objection that could be made to this class of brick. The question has been, can that objection be overcome? That question has been answered in the affirmative by Mr. Davis Brown, of the Decatur Leader Manufacturing Co., of Decatur, Ill., by his recent invention of a stiff clay machine, which he calls the Gladiator, a machine that makes brick that has all the strength and tenacity of the auger machine brick and *without any laminations*.

The writer has tested the machine and cut the brick made on it in all directions, and is so well satisfied with it that he expects to have one in constant use in a short time.

The accompanying cut shows how well the Gladiator has fulfilled its mission in making a first-class stiff clay brick *free from laminations*.

The cut is from a photograph of two pieces of brick, made from the same clay. The laminated brick was made on an Auger Machine. The brick without laminations was made on the Gladiator.

J. G. SHEA.

Decatur, Ill., March 30, '92.

BURNING WITH CRUDE OIL.

*BY N. W. REID, JACKSONVILLE, ILL.

Mr. Chairman and Gentlemen:

I was asked by our Secretary to write a paper on Crude Oil as a Fuel, and, as I think it a duty we owe to each other, in forwarding the interest of our Association, I consented to furnish something; not that I think I can master the subject, or in anyway do it justice, yet I am willing to contribute my little mite in any way that may be of interest or benefit to the convention.

Crude oil as a fuel has, with us, proven to be a grand success. Our old way of burning was with wood, which you all know requires a great deal of room for ricking, as we were compelled to keep almost a year's supply ahead in order to have it dry and in the best condition for use, as well as to be sure to have it when

we should need it, then the inconvenience of having so much money invested from year to year, was another feature which decided us to try crude oil.

In burning with wood it was impossible to get a regular burn all over the kiln, as in some parts of the kiln would be found salmon brick, while in other parts would be brick burned to about two-thirds their original size, and in the arches the brick were melted and run together or the ends chipped, cracked, or entirely broken off, which made a great many bats, causing more or less complaints from buyers and a considerable loss in money. We also find, after all these inconveniences had to be contended with, we had the ashes from the wood to care for, and a great many other things I might mention. As for coal my experience is limited, but with what I know of it, I found it more objectionable than wood; it is very disagreeable to handle, while the ashes and clinkers were a great nuisance. The greatest objection was the poor quality of brick we got. In appearance they were fine, both in color and hardness, yet it seemed to make no difference how hard they looked, they would not stand the weather like our brick burned by wood.

So, growing tired of these fuels, we concluded we would investigate crude oil, and a wise conclusion it has proven to be, so far as we have tried, although we had but the faith of a mustard seed at first. After visiting Chicago and investigating the appurtenances used by Messrs. May-Purinton & Co., we were satisfied it was the fuel. Then the next thing to look up was the expense, "which is of great importance to us all," we concluded branch out, first we tried a small kiln of 10 arches, with a small boiler; it was not a fair trial, but it proved so much of a success we decided to rearrange and commence right. Our fixtures consist of a steam boiler, burners, pipe, and storage tank. We find after burning two years with crude oil we have much better brick in every respect than with wood or coal. It requires but little room for the storage tank, and you do not have to be cut the use of your money as you do in wood. You can order the oil just as you need it and need not get more than enough at a time to burn what brick you desire. We can get oil in from three to five days, as far off as we are; then you have no ashes or dirt to contend with. With this (to us) new fuel, we get closer burns at the top and sides of kilns, and our arch brick—

which with wood were the worst brick—with oil are as good building brick as we have in the kiln, except a very few at the ends of the arch. They are neither cracked or chipped, as my friend McCabe can vouch for. Using oil is a great saving in labor. It takes but two men to attend to a kiln, where with wood it would take from four to five to handle the same kiln; then the fires are regulated much more easily.

My foreman said he would rather have one man with him to burn with oil than to have five men burn with wood or coal.

As to the cost, for us it is cheaper than wood or coal, although it might not be for others. Wood costs us \$4 per cord and coal 7 cents per bushel. Oil costs us \$1.65 per hundred gallons.

At these figures we save quite a nice sum, to say nothing of the saving in labor. We are unfortunately situated, about 1½ miles from a railroad, and must needs haul our oil in tanks to our supply tank. In burning with oil you have your kiln completely under your control. You can keep your arches at a certain heat at all times. If at any time one arch should get ahead of the rest, you simply turn the valve and bring the heat to what is desired, not interfering with the other side of the kiln.

Stormy or blustery weather seems to have very little or no effect in burning. We also gain 24 to 36 hours over the old way. Some may think it requires an expert, which is a mistake, as any man who can fire a boiler successfully can burn with oil. The question has been asked, Is it dangerous? If you have the pipes laid in a proper manner, No. We have safety valves at each corner of our kilns, so if anything should get wrong we can turn the oil off on that side without interfering with the other side. In burning with oil two years we have had no accident of any kind.

I do not wish to say anything which might induce anyone to try crude oil as a fuel, without first investigating as to the cost in his locality and visiting other plants using oil, thereby fully satisfying himself that he understands the method. In some localities coal can be bought for 4 cents per bushel. In that case I doubt if oil would be any cheaper, nor with wood at \$2.50 per cord, but I should by far rather use oil at a little greater cost than either wood or coal, as it is cleaner, easier to handle, and makes the best burns, to say nothing of labor being

*Read before the Illinois Tile, Brick and Drainage Association, January 20, 1892.

so much lighter on the men. Why any one should make a failure of oil, I can not see. One thing I should have said—oil has an odor which might be objectionable to some, yet it is healthful and not disagreeable after using a while.

A MONEY SAVING INVENTION.

The accompanying cut represents a new Double Deck Pallet Truck that has just been invented and placed on the market by the Wellington Machine Co., of Wellington, Ohio.

These trucks should be used on all pallet yards, as they carry a load of ten pallets, and as the load is evenly balanced, it wheels as easily as the ordinary truck load of five pallets, and thereby will save the wages of from one to two

cross pieces connecting the racks.

The wood used in its construction is all carriage stock and only perfect pieces are selected in making them. The wheels have cast hubs and tires, and wrought spokes, and each wheel turns independently on a heavy wrought iron axle.

For those that prefer to have only one wheel, and lay a plank through their racks to wheel on, a one wheeled truck is made. The great objection to a one wheeled truck is its liability to tip over when not skillfully handled, or when it is set down on an uneven surface. To meet this objection, a very ingenious and perfectly sure and simple device has been invented, which is attached to the one-wheeled trucks that makes it impossible for them

and general adaptability to a wide variety of users for which the genuine Pulsometer has become so justly famed.

Years of practical work with the Pulsometer, under all kinds of conditions and for the most varied users, have demonstrated the merits claimed for it in the most striking manner, and leave little more to be said in its favor. Carefully conducted expert tests, moreover, made within the past year at Stevens Institute of Technology, one of the foremost engineering schools, have given figures for economy of performance of the Pulsometer which firmly establish it in its high rank of excellence among that class of water raising machinery with which it was designed to compete, and have entirely wiped out the erroneous impression, held by some, that it is an uneconomical machine in point of steam consumption.

The test figures show that the performance of the Pulsometer ranges considerably above the performances of the average direct-acting steam pump, and its efficiency further is maintained steadily and uninterruptedly, and will not, after a comparatively short period of use, come down to a low notch, as is the case with most direct-acting pumps.

There is nothing to wear out in the Pulsometer that cannot in a few minutes, at an insignificant cost, and without removing the pump from its position, be replaced; no leakage of valves, plungers, pistons, stuffing boxes, and the like—and hence its unique position in point of excellence of performance and durability.

As regards cost, the Pulsometer defies competition of other pumps of the same rated capacities. Its cheapness and freedom from complicated mechanism at once commend themselves, even to the most inexperienced, and to those desiring simple pumping machinery capable of handling large quantities of water or other liquid, with the least trouble and expense, it is confidently recommended as the best. For additional information see their ad. on another page or write the Pulsometer Steam Pump Co., 120 Liberty Street, New York City for circulars.

MAKE HASTE SLOWLY.

"There is a man who is always in a hurry," said a machine shop superintendent the other day, "and his methods and their results are well worthy of a passing reflection. While apparently he is the busiest man on the floor, he



truckers according to the output of the yard. This is a tremendous saving for the amount invested, and the truth of this statement is unquestioned, and it has been proven very many times on yards in all sections of the country.

The peculiarity of this truck, is the manner in which the upper deck is operated. It is entirely loose from the rest of the truck, yet rests firmly, without side or lateral motion, in the castings that uphold it. Its great point of advantage is in the fact that it turns up from either side, throwing the upper deck entirely out of the way with one motion of the hand, in loading or unloading, and the convenience of this will be manifest to all. At the same time the upper deck does not reach up high enough to interfere with the

to be tipped over at any time, either in wheeling or standing.

The truck is made very carefully, so that it will please its users and every sale brings more, and to further make it popular, the price has been set at the low figure of \$8.00 for either the one or two-wheeled styles.

TO PUMP USERS.

Imitation, it has been well said, is the sincerest flattery, and the makers of the Pulsometer Steam Pump, now known the world over, have therefore much upon which to congratulate themselves. Imitations of the Pulsometer have, within the past half-dozen years, been turned out in growing numbers, but, without exception, they have failed to secure that degree of economy, convenience

really does a great deal less work than nine-tenths of those around him. See him drop that tool! There! he drops it again! Now see him hustling around! In his everlasting hurry he goes after a tool, hardly knowing which one he wants, picking up this one and that one, and all the while losing precious time. He is a rusher, and if there is a more disagreeable failing in a man's make-up I'd like to know just what it is. He runs into everybody, tips over half a dozen things, makes mistakes of all kinds, and yet manages to convince himself somehow or other that he is a very important adjunct to the establishment. I don't want any more rushers around me, I assure you. They have never done any substantial work in any sphere of life, and what is more I don't think they ever will.—Ex.

A COMMON BUT FATAL MISTAKE.

The making of brick by wet clay machinery was an innovation on the old methods, and many were incredulous as to its success. After it had become a demonstrated fact that good brick could be made with a machine, hundreds, if not thousands, of brickmakers made the fatal but common mistake of thinking that any machine was good enough to make brick with. How many thousands of dollars are squandered each year by people still making this mistake? Had they realized that no machine is too good to make brick with, there had been fewer failures, and millions of dollars would have been saved.

The making of brick by the dry process was another innovation, and was considered by the multitude a doubtful experiment. It has now been demonstrated that the best brick for all purposes are made in this way, and the leading brickmakers in the country are adopting dry press machinery. How many will still fall into the same fatal mistake of thinking that any press is good enough to make dry pressed brick? Be warned in time. Save your money by getting the very best machine that is built, even if it costs a little more at the outset than an inferior one. The difference in cost is your insurance against failure and loss. In selecting the best machine, be particular to investigate how and where the machine is built. You cannot afford to buy machines that are built under contract by the lowest bidder at so many cents per pound. You pay enough for the metal, but you do not get the material or the workmanship that warrant

durability and success. It is for the builder's interest to use the cheapest materials and the poorest workmanship, that he may make the more profit out of his contract. For your success or failure as a brickmaker he cares nothing and feels no responsibility; the dealer stands between you and him. A wise brickmaker will see to it that no middleman stands between the actual builder of the machine he adopts and himself.

Written for the Clay-Worker.

THE FUEL QUESTION.

No. 18.

DEAR WILL: In treating of quick combustion I shall confine myself chiefly to what is termed explosive combustion, just touching up a little at first the rapid combustion of ordinary fuel, and then proceeding to explosives.

It is no uncommon thing at the present day for the modern blast furnace to consume from nine to ten tons of coke per hour, extracting metallic iron from its ore at the same rate, or at the rate of one ton in six or seven minutes, while a moderate sized brick kiln will consume nine or ten tons of coal in twenty-four hours. To do this the ordinary Dutch kiln will have 230 feet to 240 feet of grate bar area, while the area of the furnace hearth will not exceed 120 feet. Now, twenty-four times the quantity of fuel consumed on half the grate area, in the same time, means a rate of combustion which is forty-eight to one. Looking into the arch of a kiln in good going order, it would seem incredible for fuel to be burnt up forty-eight times as fast, but it is only a question of air supply, which again resolves itself into a question of draft, or blast. You have doubtless observed how very slowly a blacksmith's fire burns when the bellows or fan is still, but how readily it responds when they are set in motion, and understand now why it is so, but did it ever occur to you that the phenomena of ordinary combustion are the result of a series of small explosions so quick in succession that to both the eye and the ear they appear continuous? The flame is a series of flashes, and the roar of the flame is a series of percussions—just as the vibrations of piano strings appear to make continuous sounds—in fact all sounds are the result of shock, or vibration of one thing or another.

Proceeding now to explosive combustion, or simply "explosion," as generally received and understood, let us first make a few enquiries and come to a proper understanding of what an explosion is. This is the definition of explosion in my dictionary: "A bursting with violence and a loud report, due to the sudden expansion of an elastic fluid; any violent outburst, as of pent-up elements." This definition, I think, is good, and about covers the ground, but terse enough to admit of some elaboration without being spoiled. In doing this I propose to confine myself to explosions of fuels, for I know these from practical acquaintance, and the serious inconvenience I have suffered from them led me to enquire closely into the nature of them. My earliest experiences of explosions on a grand scale were in coal mines in the North of England. These, as you are doubtless aware, are explosions of gases, light carburetted-hydrogen chiefly. By the miners it is called "fire-damp." For a similar reason they call carbonic acid "choke damp." I may here state that this destructive and much dreaded gas is not of itself explosive; it is quite harmless as far as explosions are concerned, until it is mixed with air or oxygen gas before being mixed, and when isolated it will quench flame as quickly as water will.

Seeing then that simple gases are not of themselves explosive, and the same may also be said of many of the compound gases; this one now under consideration for instance—light carburetted hydrogen. We must search out then the conditions that will produce explosions. First, then, we find it absolutely necessary to mix our gas with either oxygen or air; secondly, we find chemical combination also absolutely necessary, for simply mixing produces no effect whatever, except rendering the gases ready for chemical combination. They are now explosive, but there is still one condition wanting; that is the application of some heat; a touch with a lighted match is quite sufficient, and the explosion produced will be *proportional in violence to quantity of gases consumed and the amount of space confining them*. Looking up the conditions in this manner puts us in possession of a definition of explosion independent of the dictionary. We have now learned that explosive combustion is the combining of an unusual quantity of gases *instantly*. You are quite familiar with

a gas-burner that will consume four cubic feet of ordinary lighting gas per hour. Now just blow out the gas and let the gas-cock remain open at the four feet per hour position, but collect the escaping gas in a small steam boiler with a capacity of about thirty cubic feet; in an hour's time this boiler will contain about four feet of lighting gas and about twenty-six feet of air. The application of a lighted match to the smallest touch hole in this boiler would produce a terrible explosion, far exceeding in violence the same weight of confined gunpowder. While the gas was burning quietly in the ordinary way the quantity at any one instant of time was so insignificant that its light and heat effected our senses agreeably; whereas, the accumulation of an hour's pulsations, flashed off instantly, like lightning, shatters everything in its vicinity.

In a former number of the CLAY-WORKER (April 15, 1891) I told you of the enormous power of heat or fuel. If you have any lingering doubts about it, try an experiment similar to the above substituting a ginger beer bottle for the steam boiler, and I warrant the effect convincing enough. Precaution: Put your bottle in a stout wooden box with a pipe sticking out at top for the touch hole arrangement, and have the match at the end of a long stick, so as to fire it off at a safe distance. If you get about four cubic inches of gas in your bottle you will be astonished at the result. Then imagine 1,700 times that force; for that is the ratio between the small boiler and the pint beer bottle. Now four cubic inches of ordinary lighting gas will not weigh one grain, but for comparison weigh a grain of gunpowder and fire it off in a similar bottle, and you will find no shattering of the bottle. A slight puff will be the result and that is all.

Speaking of gunpowder, it may be as well just here to examine the explosive properties of this substance, and how it is made explosive. I may, however, just remark that the explosions spoken of above are nothing more nor less than the *instantaneous combustion of small quantities*—comparatively speaking—of fuel and its collateral results. I will describe briefly its manufacture to show you the analogy of the conditions required. It is composed of charcoal, sulphur and salt-petre; this last ingredient is also known as nitrate of potash, and its still more recent name is potassium nitrate.

These three ingredients are mixed very nearly in the following proportions: 75 parts, by weight, of salt-petre, 10 parts of sulphur, and 15 of carbon or charcoal. They are made into a paste with water, and ground for several hours between stones. It is afterward pressed into cakes, then broken up and granulated by rollers. Upon the size of the grains depends, to a great extent, the rapidity of inflammation, or combustion; the grains are therefore carefully selected for different purposes. "Pebble powder," now used in the largest cannons, consists of grains as large as almonds, and ignites comparatively slowly. The smallest grained powder is used for rifles, etc.

The following table gives the composition of musketry powder as manufactured by different nations:

	English & Austrian.	Prussian.	Chinese.	French.
Nitre	75	75	75.7	75
Charcoal	15	13.5	14.4	12.5
Sulphur	10	11.5	9.0	12.5
	100.	100.	100.	100.

These I copied from Roscoe's *Lessons in Elementary Chemistry*.

The question that now concerns us is, what makes the gunpowder so explosive? We all know what charcoal is, and what sulphur is, too, but all of us do not know what salt-petre is exactly. We can, however, get at its composition by its chemical formula, and find that it is composed of 39 parts by weight of the metal potassium, 14 parts of nitrogen gas, and 48 parts of oxygen gas, so that 101 pounds, ounces or grains of salt-petre or nitre contain 48 pounds, ounces or grains of oxygen gas. Now do you begin to see the hidden power in gunpowder? You cannot fail to recognize the identity of the conditions for the explosiveness of both gases and gunpowder, which may be expressed in very few words, thus: An intimate mixture of combustible and air, or oxygen gas, and the application of a lighted match.

Having satisfactorily disposed of the conditions necessary to produce explosions by combustion, let us now look into the "why and wherefore" of these phenomena.

When gunpowder is ignited the charcoal unites with the oxygen of the salt-petre or nitre, and forms carbonic acid and carbonic oxide, while the sulphur and potassium unites forming potassium sulphide and nitrogen is set free. The amount of gas thus liberated occupies about 400 times the volume of the in-

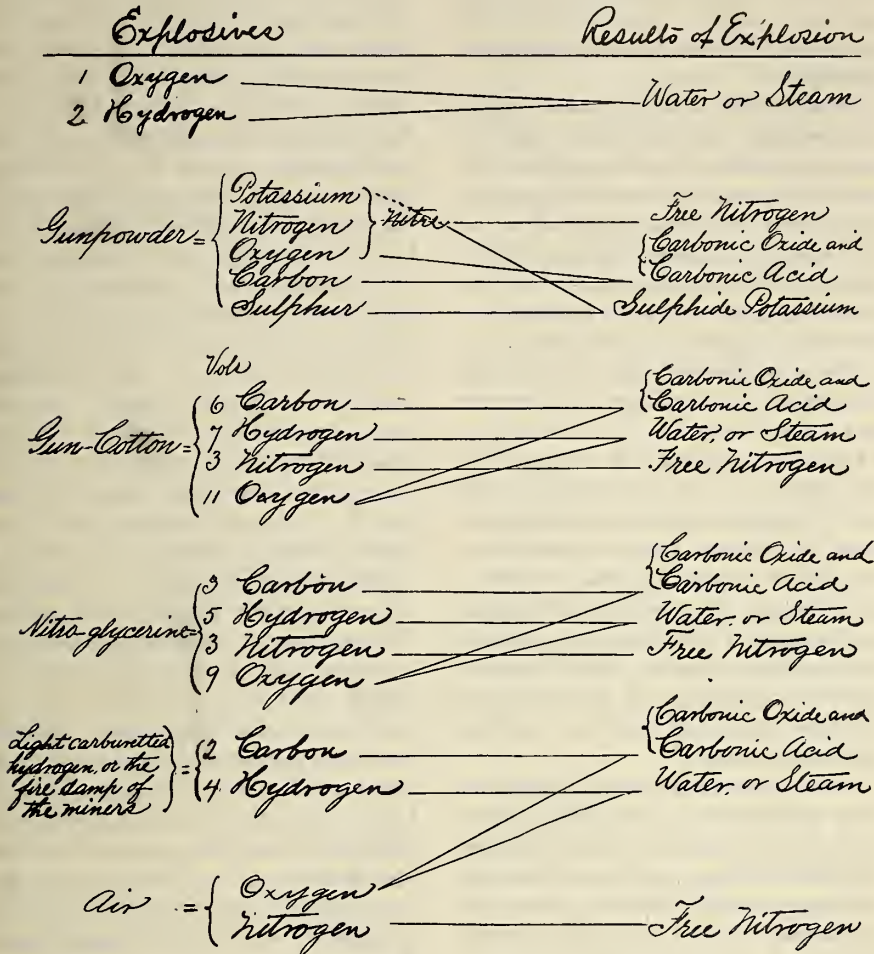
gredients before lighting, if the gas remained at the same temperature as the gunpowder, but it does not. The heat generated by combustion easily triples the volume of gases. This sudden expansion in bulk to 1,200 or 1,300 times sufficiently accounts for its disruptive force in mine or quarry, and for its propulsive force in the cannon and rifle.

The explosive force of ordinary lighting gas when mixed with air is accounted for in a similar manner; carbon and hydrogen are the combustibles and the oxygen of the air is the combining element; carbonic acid, steam and free nitrogen are the resulting gases, and, being intensely heated, they increase tremendously in volume, and hence the violence of the explosion. The maximum force of explosives is developed by mixing the combining elements in their proper proportions for total consumption. In nearly all explosives you will find a recurring of the same elements, viz.: Carbon and hydrogen as the fuels, or combustibles, oxygen as the supporter of combustion, while nitrogen plays an obscure part.

The accompanying table shows the compositions of some of the best known explosives, divested of their chemical formula and symbols:

Dynamite is nitro-glycerine diluted with sand or sawdust. This dilution renders it safer and of more practical utility. These, I think are sufficient to show the general composition of explosives. The fuels, hydrogen and carbon, stand very prominent in all but the gunpowder; that contains no hydrogen. I may inform you that there are explosives that contain neither hydrogen nor carbon. The most remarkable of these is the tri-chloride of nitrogen, composed of three volumes of chlorine gas, and one volume of nitrogen. It is a yellow, oily substance, and is the most dangerous explosive known, on account of its unstable character and the fearful violence of its explosion.

In closing this series of articles on the "Fuel Question," I must acknowledge an error of judgment. I have for some time been tempted to write a series of letters on "Chemistry for Clay-workers," and propose to commence them in the May number of the CLAY-WORKER, subject, of course, to the approval of the publishers, T. A. Randall & Co. If this had been done first, and been followed up by the "fuel question," I should not now have found myself in



the dilemma of having to "put the cart before the horse." I also propose dropping my *nom de plume*, and writing my letters under or over my proper name. My reason for writing "incog" was to avoid suspicion of using the reading matter columns to boom my "ad."

My thanks are due to Father J. W. Crary, Sr., and Bros. R. Brick and "William" for the compliments paid me. I am to hear more about "hot floor dryers" from Bro. R. Brick. I may then have something to say to both of them.

I still wish to be thoroughly understood that I am writing for the *young brickmakers* and *clayworkers* in general. If older heads profit by my writing I am that much ahead of my aim. If any of the readers discover points of error I shall be glad to be referred to them, with such corrections as are deemed advisable. Yours Fraternally,

WM. WAPLINGTON.

CLAY EATERS.

Do human beings in the United States of America really eat clay? They do indeed. Among the "crackers," or "poor whites," of the southeast there are

thousands of "clay-eaters." You can tell one as far as you see him or her. Their complexion takes on the color of the dirty-white earth they eat, their eyes are lusterless, they stoop, and stumble along as they walk.

The edible clay is found in stratifications amid the common red clay of the soil. It is often impregnated with arsenic, at least the sample the writer tested, and which is the favorite "brand" of Polk county, was so said to be. The sample tested was utterly tasteless, unless a cross between a piece of chalk and a soapstone slate-pencil can be said to possess a taste.

School-girls, in the earlier period of their "teens," often nibble at chalk and slate-pencils. The taste for clay is equally unnatural and depraved, only more so, because when the habit is acquired it cannot be given up, and it is passed down to posterity. Whole families can be seen near by, all of whom are pale, sickly and shambling in gait. But it is a cheap sort of a "habit," anyhow. There's nothing but clay down here, except rocks. But the "cracker" is often particular, and will go miles astride a dejected mule for a "gob" of his favorite clay.—D. R. Williams, in *Indianapolis News*.

CORRESPONDENCE.

THESE COLUMNS ARE OPEN TO ALL. THE FULL NAME AND ADDRESS IS REQUIRED BUT WILL NOT BE PUBLISHED EXCEPT WHEN PERMISSION IS GIVEN BY CORRESPONDENT. THOSE DESIRING TO COMMUNICATE PRIVATELY WITH ANY CORRESPONDENT WHOSE FULL NAME IS NOT GIVEN CAN DO SO BY ADDRESSING LETTERS CARE OF CLAY-WORKER.

CONVENTION ECHOES.

"Keystone's" Criticism Criticised.

Editor *Clay-Worker*:

A few words in reply to "Keystone's" criticisms in the February number of the *CLAY-WORKER* may not be out of place at this late date, in view of the fact that it is several months until the next meeting of the N. B. M. A. We think "Keystone" overlooks the important truth that the men named in his criticism have been, in a large measure, the life of these annual conventions. They are men of experience and interesting speakers. The writer has attended three of the annual meetings of the N. B. M. A., though not present at the one which met at the National Capital, and I am quite ready to venture the assertion that these gatherings would have been tame but for the interest taken in them by the members named. While it is true that others have done much to add to the interest, yet these all-round ready men have contributed so much to intensify the interest that, for one, we vote "No," with a big "N," to the suggestion of "Keystone" that they pledge themselves to keep silent in the future. The writer has not, in the past, taken a very active part in the discussions, but it was not for want of an opportunity, but for the reason that he preferred to listen to those who have had larger experience, and have given special thought to the subjects under discussion. The men named deserve much credit for their readiness to impart their experience to help others of the craft to "get on" in the world.

It is true, no doubt, that they had to go over the same ground at each meetings, but largely to new hearers. They should be commended for not becoming wearied in their efforts to advance the interest of the craft. The story of the business is one that, in some way, is ever new. The writer has it in mind to attend the next annual meeting, and will be glad to meet the gentlemen named by "Keystone" and greet them and hear them speak often, if they have liberty. Indeed, we shall feel aggrieved if the criticism referred to should, in any way, bridle their tongues so as to

detract from the interest that has been experienced in the meetings of the past. If "Keystone" would like an opportunity to address the convention at length at the next meeting, and is so modest as not to thrust in his sickle, and will whisper the fact into our right ear, we will try and secure for him a hearing, and move to make it a special order. Let us give full credit to those of our brethren who have been alive to the interests of the Association and have contributed so largely to make each and every annual gathering a feast of good things—interesting and instructive.

VERITAS.

Some Timely Suggestions.

Editor Clay-Worker:

The following thoughts suggest themselves on reading the report of the N. B. M. A., as given in the special convention number of the CLAY-WORKER:

First, Mr. McAvoy, in his treasurer's report, draws attention to the fact that the balance in hand is steadily decreasing, and suggests raising the membership fee from \$2 to \$5. Although \$5 would still be low for an association of the importance of this one, yet I think it is advisable to retain the membership fee as low as possible, in order that even the most economically inclined may not have any excuse, in that line, for not joining. Would not a better plan be to endeavor to increase the number of members? If each member would get another to join, the thing would be more than accomplished, and I am certain no greater service could be done to a brother brickmaker. Or instead of having a separate report printed, an extra copy of the convention number of "the official organ" might be bought and mailed to each member. No one could have a fuller or better report..

Second, Mr. Ittner, in his address on "A Year's Lessons," said: "I know to what straits our good secretary is put to get members to take places on the programme and speak upon subjects of vital interest, etc., etc." Brethren, this is not "according to Hoyle." That the association commands abundant resources and ability in this line is evidenced by the reports of the papers and speeches at different conventions, and that ability should be placed at the disposal of our worthy secretary for the benefit of the entire craft.

The third thought is with regard to competition and the low prices of our product. A great deal has been said on

the subject, and it is undoubtedly a hard question to tackle. A man must get up pretty early in the morning to get much ahead of it.

This question is purely one of supply and demand. As yet science has discovered but two remedies for this malady, viz., increase the demand or reduce the supply. The latter method is not for a moment to be entertained. Brick-makers who have expensive plants require that they shall be in operation to their full capacity all the time, or as nearly so as possible. How, then, is the demand to be increased? Extend the field. But how?

Let each reader, who is interested in this question, take his bundle of old CLAY-WORKERS and carefully read Mr. Louis H. Gibson's series of letters, commencing in April, '91, issue. In these will be found many very valuable practical suggestions in this line, showing what has been done in older countries, possibly to grapple with just the same difficulty which confronts the American clayworker to-day.

Prominent amongst these suggestions is the *manufacture of roofing tiles*. Read the report, in February CLAY-WORKER, of Mr. Elder's essay on this subject, and calculate what the probable increase to the demand for clay products a general adoption of this unequalled roofing material would make. A very large demand would almost certainly be the immediate result, if this article were put upon the market at a reasonable price, which can very easily be done.

One point in Mr. Elder's paper I must differ from, viz.: "It will take a very large bank account behind you, if you start to make roofing tile without knowing what you are about." Perhaps so, if you plunge into it "over head and ears" without knowing what you want, but not if you "go slow" and test the thing as you go along. It appears to me that each owner of a stiff mud machine could, with a comparatively *very trifling outlay* for dies, repress, etc., practically test the value of this most important and remunerative industry. Do not run away with the idea that the manufacture of roofing tile is something very difficult and costly, and that you must buy experience at ruinous rates. With proper care and management, and a little patience, anyone who can make any kind of pressed ware can make roofing tiles. But how?

Let each owner of a Penfield plunger (or other suitable stiff mud) machine

order a die to form a slab 10 by $\frac{5}{8}$ inches cut into lengths $17\frac{1}{2}$ inches long. The die can be made double this width with a wire across. Messrs. Penfield know what is required. If they have not a No. 3 Raymond perfection press let them procure one (a No. 2 will do to test the thing). Order a die for repress made from a sample French roofing tile I sent Mr. Arnold some time ago (he knows exactly what is required), or an other form of roofing tile which may be desired. Strike off a few hundred tiles. Dry them, before and after repressing, strictly in the shade. I find it a good plan to remedy any defects in the tile (also defects which experience teaches may make their appearance), and see that it is perfectly straight and true, before placing in the rack to dry. A handful of sand scattered over the back of the tile, when placed on the pallet, will do no harm. Set, when *perfectly dry*, in the kiln, on their sides in pairs, reversed, their backs together. Burn as hard as the clay will stand. Handle same way in pairs. After having made and burned a few thousand, you will know what you want, and whether it will pay or not; *then* go ahead. These tiles should not cost more than \$15 per 1,000 all told. Roughly estimated it requires ten tiles to a square yard. What cheaper roof, *taking quality into account*, can be asked for?

Another of Mr. Gibson's suggestions is "Enameled Brick." This is a business I know little of, but think it would be exceedingly remunerative in the States. I would say, read "Manager's" letters, and if necessary correspond with him on the subject.

Paving brick is now an established business. All it wants is localizing and *reducing the cost of production* to make its use universal. I would suggest, in connection with this business, the paving of the sidewalks with hard burned flooring flags. It is by far the best material in existence for this purpose.

Read "Hydro-Carbon's" most interesting and valuable letters on "The Fuel Question" (all these letters are in same issues of the CLAY-WORKER), and find out where any leakage of heat is going on, and apply the remedy. "Take care of the pence, the pounds will take care of themselves," is an old English proverb which must ever be borne in mind in the brickyard of the successful manufacturer.

One thing the craft must do is not to look upon each other as

competitors, but as brethren. The real competitors of the brick trade are the rival building, roofing and paving materials, such as stone, wood, iron, slate, asphalt, etc. United effort must be directed against these, the common enemy. In this light the low prices complained of are even helpful. Brick is just like everything else, the lower the price the larger the demand. It is like cutting off a pyramid, the lower you get the larger the area. Taking this view of the matter, every labor-saving and cost-reducing device must be investigated, from the clay bank to the storage shed. With low prices will, and must, come low cost of production, and (as in other business) what is now looked upon as blank ruin, will be found to leave a nice margin of profit. These matters must be thoroughly discussed. Convene at the National Association, and organize in local districts, not to attempt to regulate or advance prices, but in a friendly way to discuss what is best to be done in every way. Much has been said about organization. I fully agree with the view expressed at the convention by Mr. Purington, that the man who cannot stand upon his own bottom and sell his own product, without help, had better retire from the trade. The same (after reading Mr. Homes' paper, reported in February issue of the CLAY-WORKER) may be said of the man who wants to shelter behind a McKinley bill from competition which has a 3,000 mile freight, besides heavy cartage and shipping charges to pay, which, on an article as heavy in comparison to its value as brick, forms a natural protection, sufficiently prohibitive, I should think, to satisfy the most ardent "tariff man." "Protection" and "help" are words which ought to be relegated to the nursery. They are humiliating when applied to the independent American brickmaker, on the eve of the twentieth century.

If there is one business more than another which should advocate "free trade," it is that of brickmaking. The nature of its product forms for itself a natural protection, while import duties tend to advance the prices of every commodity with which it has to do.

R. M. GREER.

Tuxpam, Mex., March 17, '92.

The Geneva N. Y. Brick Co., want a practical man to take charge of their plant—one familiar with machinery can secure good position.

Western Pennsylvania Brick Exchange of Pittsburgh, Pa.

Editor Clay-Worker:

No doubt your readers will remember that Mr. McGraw, a member of this Exchange, read a paper before the National Brick Manufacturers' Convention held at Washington, D. C., January last.

I mention this to call especial attention to the subject matter therein contained, and for this reason that I do not think the paper was fully understood by many members of the convention at the time. I have before me a copy of the constitution and by-laws of the Pittsburgh Exchange. Article III, under the head of "Objects," reads as follows:

"The object of this Exchange shall be to encourage a spirit of friendliness among brick manufacturers; to secure a unity of action in all matters that may benefit the trade; to secure a uniform remuneration for the products of its members; to establish a standard size and classification for brick; to avoid or adjust and settle any misunderstandings and differences that may arise between parties engaged in the business; to reform abuses that may exist or arise; to secure protection against unjust and unlawful exactions, and to protect our members from loss through unscrupulous buyers, and to facilitate and secure economical measures in the manufacture and delivery of brick."

Article IV, under the head of "Powers," reads as follows:

"This Exchange shall have the power to establish and maintain a scale of prices for the various grades of brick; to establish a uniform size for brick and standards by which they may be graded and classified; to adjust all differences that may arise between parties engaged in the trade by means of arbitration; to enforce contracts; to make such assessments as may be deemed necessary for the maintenance and welfare of the organization; to adopt such by-laws, rules and regulations as may from time to time be judged advisable, and to enforce all these, together with the constitution by penalties or other means."

I must say that a careful examination of the above articles does not, to my mind, reveal anything like "Trusts," though I confess some were so impressed from the reading of Mr. McGraw's paper.

In Article III these words: "To secure a uniform remuneration for the products of its members," might, by straining a point, be construed to operate as a trust, but the first clause of

Article IV clearly provides, among other things, that these regulations apply only to the members of the Exchange.

Under the head of "By-Laws," Article II, head "Classes and Prices," we find:

"Brick shall be classified and prices fixed according to the locality and state of the market, said prices and classification subject to change at the discretion of the Exchange." This by-law clearly defines the objects of the Association as to prices, and, I think, is highly proper.

What is more commendable in a local association of brickmakers than that they voluntarily agree to classify their products and fix a local scale of prices accordingly.

Space will not allow mention of all of the articles and by-laws, but one deserves especial notice, viz., that referring to arbitration. The article and sections pertaining to this head are lengthy and explicit, and the rules and regulations for enforcing the same are fair and just. I am sorry I cannot go into this matter at greater length. I trust, however, that enough has been said to induce members of the craft in other cities, not having similar organizations, to procure copies of the constitution and by-laws of the "Western Pennsylvania Brick Exchange," and examine the same carefully, and that similar organizations may be started in many localities, always leaving out all ideas of "Trusts."

One feature I feel I must mention in connection with this Exchange, viz., that of its social qualities. I chanced to be at the Seventh Avenue Hotel, Pittsburgh, Tuesday, March 15, where I was waited upon by a special committee from the Exchange bearing an invitation couched in the persuasive language which only a brickmaker knows how to frame. The dialogue ran something like this:

Mr. Jones (Spokesman)—"We heard you were in the city, and as our Exchange holds its annual banquet to-night, we have been appointed a special committee to wait upon you and invite you to be present."

"But I had thought of going away—"

Mr. Jones—"None of that; you are invited, and you are going, and you may consider yourself highly honored, as yourself and one other are the only persons outside of the members who are invited."

I consented (it is fair to remark that I had no intention of doing anything else but consent). Well, I went, and a

finer banquet I never enjoyed. There were in all from fifty to sixty present and a more social gathering I never attended. In all the feasting and toasting, interspersed with as good music as I ever heard, nothing was said that would indicate but that the members expected to be honest with each other and the community in which they live. All seemed to be alive to the fact that, in order to stimulate building and improving, which always creates a demand for brick, capitalists must have some assurance of a steady or fixed market for brick. No one knows better than the brickmaker the necessity for a uniform price for brick of the same grade. The capitalist likes to know that if he begins large improvements based on getting his materials at certain prices that they will not be advanced. While it is impossible always to avoid fluctuations in prices, we think that a proper organization of the brickmakers in various localities, based on correct principles, would do much to prevent an unnatural or forced fluctuation in prices. True, the law of supply and demand cannot and should not be overcome, but the sudden increase or decrease in prices is usually ruinous to business of any kind, and ought to be prevented, or at least modified. This, we think, can be done by a proper organization of the brickmakers. We are not advocating these measures for the National Association—its organization is for another purpose.

Another advantage of local organizations is, that men of the same city or locality are brought together in a friendly way, which of itself tends to make men better. If opponents in all kinds of business could be brought to discuss each other's interests in a friendly way, there would be fewer law suits and greater profits in business.

Referring again to the banquet, it is fair to say that

"The 'four-year-old' tried to stand on his head,
But the band played—and he sang a song instead."

W. A. EUDALY.

A Hoosier Plant.

Editor Clay-Worker:

I never see anything in your paper in regard to the brickmaking interest in this section of the country. We have a small brickyard about 12 miles west of Marion, Ind., on the P. R. R., with a paid up capital stock of \$10,000 and a capacity of 4,000,000 brick per year. We use the Penfield up-right stock

brick machine and would use no other. Also have pug mill and clay crusher, and dry our brick by the hot floor process, on a floor 120x126. Will enlarge the dry floor to twice its present size in the spring. We have 260 feet of kiln shed; our clay bank is good, being from 2 to 6 feet deep. We burn with natural gas and find it a great saving. We began making brick on the 28th of May, 1891 and closed down November 20th, 1891, having made over 2,000,000. Our trade is good, largely home demand. The prospect for the spring trade is very promising.

THE XENIA PRESSED BRICK WORKS.

Xenia, Ind.

New vs. Old Methods.

Editor Clay-Worker:

After reading "Village Brickmaker's" epistle in the last CLAY-WORKER to the brickmaking fraternity, I must say I think he is in the same fix that "R. Brick" thought I was, when he said I had cut off automatically more than I could chew, except that V. B. M. does not use such modern appliances as an automatic to cut his chewing, for he sets forth in his letter the case of a poor fellow that is unfortunate enough not to have the proper qualifications for a brickmaker either by hand or machinery, but who has one faculty in his make-up that is wanting, apparently, in friend V. B. M.; one that has placed this glorious America ahead, in almost every line of business, of any other country on the face of the earth; that faculty is progressiveness, or adopting new and improved methods. If all people were of the same opinion as V. B. M. where would our railroads, telephones, electricity and a number of other improvements and important inventions be?

All inventions must be developed, and as many of the inventors have not the means to make the machinery and place it in practical business operation, therefore, they must call upon some man in the line in which the invention is to be a benefit to give it a practical test, and if the inventor or machine builder is so unfortunate as to strike a man that is apparently so impractical or so fickle minded as to change his machinery as often as the V. B. M. says his man has, and I dare say without giving it a practical test, and in a vicinity where the people are so remote in their ideas as to be prejudiced against a thing (stiff or plastic clay brick) that has been in practical use and stood the test

in European countries for fifty years and in this country for twenty-five. This machinery builder is to be pitied, for the reputation of the man as an inventor and machinery builder has been set back and damaged for years in that vicinity, on account of the people being like the old maid that insisted on dressing her hair in such a manner that made her the laughing stock of the community in which she lived, simply because she "didn't want any of them new fangled fixings around her," and because the man had such poor business qualifications as to be compelled to expend \$2,500 for a superintendent, salesman and boss of a yard to make 1,200,000 brick, when there are thousands of yards over this country that make more brick with no one but proprietor to fill all the above positions.

I know a man who had been running a hand yard with two molders, making 5,000 brick per day each for years. Now V. B. M. can tell how many men and boys it required to make and handle this number of brick and to get them hacked in the kiln and the number of men that it required to burn and to deliver them to the buildings.

Now this man bought a stiff clay machine that with trucks, barrows, shafting, pulleys, elevator, belting, engine and boiler cost \$2,000, then invested \$3,000 in sheds for kiins, engine and machinery buildings and dry sheds, racks and pallets to hold 150,000 as his clay was of such a nature he could not dry them hacked on the yard, also two horses and carts, now this \$5,000 is what it cost to erect this plant.

It required men to operate the yard as follows in the clay bank and teamsters for dump carts, five. One man and one boy to feed the machine and temper the clay, one engineer, who also looked after the brick machine, two boys to remove brick from the off-bearing belt and hack them on pallets which were on the trucks. The drying racks were built at right angles with off-bearing belt and brick had only to be trucked 100 feet at the farthest and on a level board floor, sixty brick to the truck, it required two truckers to truck the brick to a man who placed the pallet with eight brick on the rack.

Each shed had a capacity of 24,000 brick and it required six of them. Now he employed two truckers to the kiln and one setter and one as a general utility man to look after the odds and ends.

I will not say anything about burners or brick haulers, but will say that the proprietor was a contractor and superintended the manufacture, sale and setting in the wall on an average of the majority of 22,000 brick per day that this machine yard turned out, and has for three years. This man figures 10 per cent. for interest and taxes, 10 per cent. depreciation and repairs, and says it has never reached the latter because by giving the machinery and yard a little attention it is kept in good repair, (in other words a stitch in time saves nine), he does not consume the latter 10 per cent.

Here is a recapitulation of this man's work with prices paid:

Clay bank men and drivers to dump carts who helped shovel—five at \$1.50 per day..	\$ 7.50
One feeder.....	1.75
One boy to help.....	.75
One engineer.....	2.00
Two off-bearing boys at 75 c.....	2.50
Two truckers to dry sheds at \$1.00.....	2.00
One hacker in dry shed.....	1.50
Two brick truckers at \$1.50.....	3.50
One setter.....	1.75
One general utility man.....	2.00
Now count interest, insurance, repair, etc..	6.00
Fuel \$2.00 and oil and waste 50 c. and clay at 20 c. per M.....	6.90
Total expense, 3 boys, 14 men and other expenses.....	\$36.65

Thus making the brick cost \$1.67 per thousand from the clay bank to set in the kiln ready to burn and with a "sausage stuffer machine" as V. B. M. is pleased to call it, this yard turned out three and one half million brick last year. We give this as an offset to the V. B. M. man's work. This machine often turned out 35 M. per day with this crew of men.

We cannot help but look at V. B. M.'s letter in the light of one of our modern sewing circles where the needles stopped when gossip turned on the mismanagement of some unfortunate neighbor.

It is of no particular benefit to the trade because it only shows the extravagant and impractical workings of his neighbor brickmaker who had the sand to advance some new ideas in that immediate neighborhood; what seem to be "hard nuggets" are no nuggets at all, as he admits that the trouble was not with the machinery but with the man.

I agree with friend V. B. M. in one thing and that is "the machinery men would seem to suffer at the hands of these experiments. The losses to the machinery men placing their machinery in the hands of all kinds of men on trial, some being foolish enough to guarantee the repairs for years, has a tendency to make men reckless and careless with their machinery and invites impractical and sometimes unscrupulous

men to venture into buying machinery and going into business. I sometimes think when friend Purington gave the advice at the Memphis meeting of the N. B. M. A. that he did not take this fact into consideration when he advised the purchaser to buy his machinery only when the manufacturer would place it subject to trial and satisfaction.

Now some one must pay for losses caused by such men as V. B. M. speaks of and those that do pay are none other than we that make our machinery work successfully. The machinery men can not afford to lose it, and, as a rule, do not, and we sometimes think if we would buy our machinery and take our own chances, our machinery could be bought for a very much reduced price.

We will agree with V. B. M. on this last sentence regarding "brains to run our diversified business," but will say, good lubricating oil and horse sense is all that is required to run machinery.

In closing, will say, that friend V. B. M. will wake up some fine morning and find some fellow with a "sausage stuffer machine" of the improved style making and introducing into this market something in the brick line more modern than the old "straw brick."

TIM TINKER.

The Strike Problem.

Editor *Clay-Worker*:

Your editorial on strikes in the March number of the *CLAY-WORKER* is to the point, with good logic, tersely expressed. That the practice of strikes has assumed proportions of paramount importance, there can be no doubt. The very nature of free government makes it prolific in abuses of the rights of classes, for the reason that the spirit of the fundamental law cannot be enforced only by the voluntary action of the different classes, and if the spirit of constitutional law is not observed, the letter of the law loses its force and virtue.

The system of strikes (for it has come to be a system) is founded in the right of every citizen of the United States to do as he may elect, provided that he does not violate the rights of other citizens. This may sometimes be a question for courts to decide, but the average citizen is fully aware of the extent of his rights. The *trades union and guilds of the country* perfectly understand that no law can be made to prohibit their organization, or to prevent their strikes. If a majority of all the people were to strike, and say, "we will not work unless

our demands are acceded to," there is no power on earth that could stop the strike and compel the strikers to go to work. But the moment the strikers attempt by arbitrary force to prevent the minority, whether strikers or not, from going to work, that moment they become despotic and revolutionary, and having violated the fundamental rights of others, they tacitly agree to forfeit their own rights and become outlaws. If every man in Indianapolis, outside of the strikers, during your late strike, had armed himself and joined the police, and shot down the strikers at their second attempt to interfere with the business of the railroad, the highest court in the land would have fully justified the action.

You speak of the difficulty in making a law to arbitrate the questions involved in strikes. Your conclusions are right. We might as well pass a law to arbitrate the question of divorce or of marriage promise, after Miss Smith and Mr. Jones had broken up the match by mutual dislike. Arbitration must be by mutual consent, and then the decision is not binding until written, signed and passed for good consideration.

The only way to cure strikes is by a system of mutual voluntary co-operation or co-interest. I have given this subject a great deal of thought and consideration, and can see the fault, and I think the only remedy. The capitalistic class are really at fault in the labor troubles of the country. The laboring classes are not lawyers, political economists, philosophers or statesmen, and don't understand charity as well as St. Paul did. They may "hope for all things," like Paul, but they will not "believe all things," or "endure all things," like Paul. They have seen, for the last twenty-five years, that the speculative capitalistic class has used all possible illegitimate means for enriching themselves at the expense of labor. It is a bad way for a railroad corporation to teach their employes lessons of lawfulness and morality by "watering" their stock, so as to make one dollar count three, and then, under a one-sided charter procured by lobby money, squeeze a ten per cent. dividend from their watered stock.

If the employes of labor would say to their employes, "Our plant, or road, cost a certain sum of cash, now look at our books and see the exact profits. Now we want ten per cent. clear on our investment, then we want a fair reason-

able salary for our time and attention to this business; the balance of the profits we are willing to give to you, according to your class of service to the company." Let the employes sign this agreement for a stipulated time, receiving three-fourths of their wages weekly, and depositing one-fourth with the employer, as a guarantee of faithful performance of contract. Wages to be fixed at common rates, and dividends of profits made every six months. This adjustment of labor and capital, being founded on strict principles of justice, equality and law, would need no legislation to enforce its rules. It would leave the employe without even the ghost of an excuse to object or strike. "There is honor amongst thieves," is an old proverb. Nine in ten of the laboring wage working class would subscribe to this adjustment, and promptly aid its enforcement. Indeed, the interest of employe and employer would be so identical that a distinction would be impossible. Every employe would study the best interest of his employer. They would tolerate no *drones* or *deadheads*; economy and efficiency would be their motto and rule of action.

If the business engaged in was subject to low profits, by the fluctuations of trade, etc., the employe would be content and wait for a favorable change, or else seek other employment. If the business was paying a high dividend, he would be benefitted precisely as his employer. All things concerned would naturally and practically tend to mutual co-operation, interest and profit. I have no space here to show the almost countless benefits that would result from the working of the plan here outlined. That it is fair, just and practicable is self-evident. Very truly yours,

J. W. CRARY, SR.

Making Brick in Detroit.

Editor Clay-Worker:

A brickmaker's chief object is to make brick that are perfect. When I say perfect I mean to overcome the feature of allowing brick going to waste, which arise from different causes. Often a quantity of brick are made and dumped on the yard in the sun to dry, and when dry enough to hack one will see, perhaps, hundreds, on different occasions, that are defective, some cracked, some with the corners chipped off, some thicker at one end than at the other, etc. What causes this? Has the clay been molded too stiff? Was the clay not

tempered enough? Was the machine clogged with bits of grass, weeds, etc., from the clay? These questions often arise.

I will endeavor to make plain the method practiced with successful results by brickmakers in Detroit, who rarely, indeed, have brick go to waste by any of the causes stated above.

When a mud brick machine is erected it is provided with double soak pits, and an elevator. The pits are made water tight, each pit contains clay enough to mould 32,000 brick, or a day's work. When the pit is to be filled, water is turned on until the pit is near three-fourths filled. The clay is then hauled from the clay bank and dumped in the pit and allowed to soak all night. In the morning the clay will be like a very thick jelly, the small lumps will all be dissolved, and the clay will be in a good state to make good brick.

Now we give our attention to the machine, which is not allowed to turn more than eight or nine molds of brick per minute. Here is where the chief cause lies in having brick go to waste. If the clay has not been properly and thoroughly soaked, the small lumps have not been dissolved, these same small lumps will crack and chip the brick when they begin to dry in the rays of the sun or in a dryer. If the machine is allowed to run faster than nine molds per minute, the men, in their hurry to "keep up," will certainly jar the molds too much, and the brick when dumped, are what is called "bull heads," on account of being thicker at one end than at the other.

Often when the brick slip with difficulty from the molds, sand is mixed with the clay. If one happens to mix too much sand with the clay the result is, when the brick are burned they will have a color which will stamp them as "soft brick." A good remedy for this is to have the molds washed clean immediately, throw out the sand in the sanding box and replace it with a fresh supply. Do not give the first few molds quite so much pressure, and one will find the brick will slip readily. It is also a good plan to have the molds washed when about eight thousand brick have been molded. In the sanding box a fresh supply of sand should be used for every three thousand brick molded, which will keep the molds from clogging.

Perhaps we have done exactly as stated above, and we find that we have

brick that are warped or bent. How did this happen? Perhaps the brick were edged and hacked before thoroughly dried; this is very often the case. Mud brick that are made to-day should not be edged and hacked until to-morrow, providing the weather be very favorable.

There may be other methods in vogue quite as good as the foregoing, but I doubt if better results are obtained.

DOROTHY DALE.

Philadelphia News.

Editor Clay-Worker:

The building operations of this city seem to be increasing, and in this respect the records show that March was an exceptional month in the realty world. The number of permits issued for dwellings and other buildings were 2,006 as against 1,727 for the same period last year.

Architects are now preparing revised plans for the Girls new Normal School, and quite a number of large dwellings in the city and suburbs. At Broad and Jackson Sts., fifty houses are to be built; at Broad and McKean Sts., 38 houses; and quite a number of new stations will be required for the Reading Railroad Company. Mr. W. S. P. Shields, an extensive builder also proposes to erect over 100 houses at 21st and York Streets.

The brick manufacturers, all, or nearly all, report business in a fair condition, with prospects of an early and brisk spring trade.

Murrell Dobbins, the well known brick manufacturer, reports a good complement of orders on hand, also that he has secured one order for 4,000,000 brick for his up country yards.

The awarding of the contract for the erection of the "head house" of the Reading terminal to Chas. McCaull has raised quite a breeze among the brickmakers of this city, which may cause a protracted delay in the construction of the building. The committee on bricklayers claim that Contractor McCaull was receiving the contracts for various portions of the Terminal, and as general contractor was ignoring the master brickmakers and usurping his prerogative. It appears that the contractor intends forcing the work by operating both night and day without paying the hands the extra demanded of 67 cents per hour for all time over the regular nine hours' work. According to the plan proposed by Contractor McCaull to work two gangs twenty-two hours, the Conference Committee will insist that 45

cents an hour must be paid for nine hours' work, and 67 cents an hour for the remaining thirteen hours, or a total of \$12.76 for the 22 hours' labor.

The master bricklayer will attempt to score his point at this juncture, as a dispensation will be granted to the journeymen bricklayer to work for the master-bricklayer in two gangs, one day and the other night of nine hours each at 45 cents an hour with 67 cents an hour for overtime. According to this schedule McCaull will pay \$12.76 for 22 hours' work, while the master bricklayer will only pay \$10.78 for the same amount of work.

The Journeymen Bricklayers' Protective Association, it is understood will stand firm in this matter, and unless the Conference Committee is sustained, will order their men not to commence work on the building unless their demands are satisfied. Should Contractor McCaull decline to pay the advance he will either be obliged to secure non-union or stop work.

A meeting of the Brickmakers' Association, was held during the last week in March for the purpose of devising some means for increasing the price of bricks in general, they being entirely too low at present. It is understood, however, that no positive understanding was had in the matter for the present.

The scheme was to appoint a selling agent to whom all orders received from the members of the pool were to be turned over to the Association. The agents would then place the orders with the members pro rata, the percentage of each to be determined upon by the measurement of the kilns in each plant, or by the average output of the individual yard. The new proposition looked forward to the formation of a corporation composed of all the large yards in the city, of which there are forty. The contemplated pool had its origin in the low prices that have prevailed for over a year, when many bricks were sold under the cost of manufacture.

While about 80 per cent of the manufacturers are in favor of adopting a plan whereby they can realize a margin of profit, there seems to be a hitch as to binding each individual yard to stand by the agreement. Another important feature proposed is to have a settlement every sixty days; by this means pooled capital would be turned four to six times a year.

The number of bricks laid last year in this city was about 450,000,000 and

300,000,000 made, the overstock on hand supplying the deficiency, and unless some settlement is effected, the yards will not turn out their full quota of bricks in 1892.

The Jardin Brick Co. have a number of small orders for buff bricks, and are bidding in a few quite large contracts. The outlook, they say, is very promising for fancy bricks of all colors, buff being the prevailing color, though.

The vitrified brick is now largely used for paving purposes, and the finer grade is used to some extent for beautifying fronts of costly dwellings. They come cheaper, and in a great measure are taking the place of buff brick now so popular.

The Fire Brick and Clay Retort Works are, as a rule, dull, with no probability of a change for the better until the iron interests become more settled.

ANON.

There Are a Good Many of Them Left.

Editor Clay-Worker:

Enclosed please find a postal note for \$2.00 for your valuable CLAY-WORKER. I received the Special Convention number, read it with interest and I think they must have had a great time. I wish I could have been there, but I was not able to do so. The paper on "Machinery" by W. R. Cunningham, Frankfort, Ind., was good, as were, also, a great number of the papers on other subjects. Machinery is a good thing when you have a demand for the brick, but what good would a machine be to me and many others of my kind when we only sell from one hundred thousand to two hundred thousand in a year. With a machine of a capacity of only ten thousand it would take twenty days to stock up and leave all the rest of the year with nothing to do. This is the reason why we see many advertisements in the CLAY-WORKER of brickmakers selling out, some running four or six months and some a year. And another reason is incompetent foremen, even if they would have a good demand for the brick.

Brick machinery, patented kilns, patent sand molders and dryers are all right, if you have money, knowledge, and a demand for your brick.

If your traveling correspondent comes out our way, we would like for him to take a look at our hand yard, and a one-horse one at that, but nice and clean. We burn with wood in common case

kilns in nine to ten days and dry on the yard and in hack.

Our city is advertising for a man or company to start a paving brick plant, but have not yet succeeded in completing arrangements with any one.

Truly Yours, J. T. DOOLING.
Virginia, Ill., March 23d.

An Advertiser's Views.

Editor Clay-Worker:

Please find check for amount due for "ad." which pays me very well. My trucks are very popular. I am now shipping trucks to different points in Florida, Georgia, South Carolina, North Carolina, West Virginia, Arkansas, Texas and Missouri, and during the spring will cover a much wider scope of country. One large company in Georgia are using 20 trucks.

If I were you I would object to my friends "asking" Mr. C. T. Davis "for mercy,"* as he puts it. His jealous vent to his amiable (?) disposition, which he may call vengeance, only advertises you and injures himself. When he sees how badly he is hurt and you not ruffled, he will feel so badly that you will be glad that you did not kick him. The CLAY-WORKER is more than twice the size of its would-be competitor and has about three times as many "ads," is still growing and ought to for it is not only far superior to its follower, but is among the ablest trade journals in America. The National Brick Mfrs. Ass'n may well be proud of such an organ.

J. C. STEELE.

Statesville, N. C., March 22, 1892.

*[The statement referred to, like all of that worthy's utterances relative to us, is false. No friend of ours has written any such letter. If they had, our readers may rest assured that the letter would have been printed long ago. The plain truth is, truth does not dwell with Mr. Davis, but is a stranger in his household. Some day he may realize the error of his way and reform, we hope; so far as it is, he is his own worst enemy.—ED.]

A Difference of Only One Letter.

Editor Clay-Worker:

I notice in the CLAY-WORKER for March that in your local notice of the Imperial Shale Brick Co. you say that the Co. has purchased eight acres of land. This should read eighty acres. With a capital stock of \$100,000 and only eight acres of shale land we would

soon be out of material. The company has eighty acres, of which at least sixty acres is shale—on an average of forty feet deep, under which we have lime stone, coal, and a fourteen-foot vein of fire clay. The company own a valuable piece of property with an abundance of material to manufacture extensively for generations to come.

E. D. KEPLINGER, Sec. and Treas.

Causes of Failure.

Editor Clay-Worker:

I was connected for over four years with one of the largest brick works in this country. The proprietor, a most excellent gentleman, and a man of great wealth, was induced to go into business by selfish and designing men who had no practical knowledge of the art of brickmaking.

During construction unnecessary help was employed; disastrous experiments with all kinds of machines and dryers, and many mistakes made. Men ignorant of all knowledge of brickmaking was placed in leading positions and confusion reigned.

There was much speculation, contrary of views and wild and fanciful theories among these would-be brick-makers. It was amusing to listen to the numerous theories advanced. I will briefly mention a few of them, and their utter absurdity is apparent:

One alleges that he has discovered the proper way to dry and burn brick. He would construct a single tunnel one half mile in length; draw the cars constantly from lower end of tunnel and keep them in constant motion, refilling at the upper end. He asserted that the bricks would be dry by the time they traveled the entire length of the tunnel.

To burn them he would build the kilns on boats and burn them on their way to the market. Another, not so learned, suggests, that the brick be perforated to make them dry and burn easier.

One man proposes to place the tosser on top of the kiln and toss down to the setter instead of up, as it would lessen the labor of the tossers.

The same man suggests that the setters use tongs when the bricks from the dryer are too hot to handle.

The few employers that had had experience in the business before, was given subordinate positions, and not allowed to express their opinions, for to have dared to offer suggestions for the good of the place, would have been

looked upon as the height of impudence and an insult to the understanding of these learned gentlemen in charge, especially if the one offering the suggestion was unfortunate enough to hail from the West.

Finally after much experimenting and heavy losses the works was completed, and chiefly through the efforts and advice of Mr. R. C. Penfield, who used his influence with the owner, better order was brought about.

Competent men was placed in charge of the different departments and the most satisfactory results followed. The works now should have made money, but there was weakness in another quarter; and besides the owner made large sales to irresponsible parties which, coupled with his former losses, forced him to assign.

Had competent men been employed in the start, hundreds of thousands of dollars would have been saved; the works the model one of the country, its owner's pride, and he would now enjoy peace of mind and a handsome profit from his product.

Will this gentleman's costly experience serve as a lesson to new beginners? I sincerely hope so. GEORGE WALKER.

A Good Opinion.

Editor Clay-Worker:

I read your CLAY-WORKER with interest and appreciate the many ideas put forth by your contributors.

While visiting the "Smoky City" last week, I noticed the great run that stone is having there for fronts. This is not as it should be; brick with terra cotta trimmings can double discount any stone front that was ever put up, in my estimation, for beauty and elegance.

Probably the "stone men" "sugar" the architects more than the "brick men" do is the reason for that, though.

W. R. OSBORNE.

Butler, Pa.

Fortunately Fixed.

Editor Clay-Worker:

We enclose herewith draft for \$2.00 to apply on our subscription account to the CLAY-WORKER for this year.

Your paper is too valuable to do without. The outlook for the coming season is bright. We are using a Kells & Sons brick machine and it works to our entire satisfaction.

We have the nicest clay bed we have ever seen. It contains about 50 acres; is clay 22 feet deep, with only from one to two

feet stripping on top. The quality of the clay is of the very best. We have had it analyzed, and it proves to be suitable for paving brick, drain tile, pottery and the very best building brick.

DELBOM, JOHNSON & Co.

Willmar, Minn.

The New York Market.

Editor Clay-Worker:

The world is the graveyard of disappointed hopes, it is truly said. March has been a disappointment as the weather was so bad that the consumption of brick was so small there was always a full supply on hand to pick from. Before the month was ended brick had arrived from Rondout, with the result of insuring a grade of brick on the market that always rule lower in prices than their more favored neighbors farther down the river. As has always been the case, the buyers will use them, with the result which is sure to follow of a shading in price of a better article. Another case of hopes of a fair return dispelled. When I wrote you last month of the shipment of brick from here, the ruling figures was about \$6.00 per M. After the barges had been on the market for nearly a week, \$5.50 was the price realized. At present time it looks very much as if there was to be a continuation of disappointed hopes. Labor trouble is growing every day. The past three months is no better than the 1891 as regards the number of buildings to be erected. Just at present time there is quite a demand, or I might say from day to day there are a few barges taken off the market as the result of good weather.

When one stands on the docks at 30th street, which is the market, and sees a tow of ten or twelve barges arrive in the morning from Haverstraw, before noon another tow from Newburgh, and before sunset another one from Rondout, as soon as navigation is open to Albany, still another tow will deposit its quota on the market.

Some of your readers may think of a plan by which this market can be manipulated so that a reduction in supply will be made. It seems as though it were impossible for our manufacturers to agree. It is summed up in a few words. Some of the manufacturers, especially the larger ones, would like to get the smaller ones to draw the chestnuts out of the fire by curtailing production.

On the 17th of March a few "Brave

Spirits" met in New York to see if there could not be some concerted movement made. There were but a few present, so they adjourned until the 24th of the month when they appointed a committee in each place to wait on the manufacturers and see if they would not sign an agreement to commence molding on the 9th of May.

It is a strange thing that some firms are always the first to cry stop. There is one firm that is always ready to talk, and will send some member of their firm to all the meetings, and it has been the case within the past three years that one of them has gone around with the petition for signers, but when you look over the list of names you fail to find their name there. It has become a by-word here when any of our manufacturers are asked to sign, "Has so and so signed?" A negative answer is always returned. It would seem that an officer of the Association and one that is always first to advocate a reduction, they should, as the boys say, take a tumble and head the list. The committee reported on the 28th, but no action was taken. They adjourned until the 6th of the present month. Probably by that time they may get the required 60 per cent. of signers.

There is at present no active movement here to commence, rather waiting to see what will be the outcome of the movement. There may be no signer here, but if the meeting concludes that they can carry through the measure the majority of our manufacturers in Hackensack will fall in line, as they have done before, although not signers,

Straws are indications, at times, of how the wind is blowing. As one of the straws of the brick industry for this year, I will quote one contract made by a prominent up river manufacturer. He has agreed with Messrs. Candis & Kane for forty million of brick delivered on dock for \$5.75 per M for smooth, and a lower figure for washed. Is it not about time that something was done when a prospective low market is discounted at such figures and quantity?

Messrs. Gardner and Gillies commenced to pump out their bank—clay, not National—on the 30th of March. It will take from eight to ten days, of 24 hours a day, to remove the water. It will take some days for the mud to dry so that they can get in it, and of course wet weather will retard them somewhat.

It seems as if the manufacturers at Newburgh Bay are having rather poor luck. Last fall two firms at Fishkill disagreed, and at New Windsor a firm agreed to dissolve, and when the settlement came the debit side of the ledger showed thirty-six thousand dollars more liability than credits,—more "blasted hopes."

The report from New York market says that there are plenty of barges here to supply demand and price about the same. Best Hackensack \$5.00 to \$5.50. There was a barge load of pales from here sold for \$1.75 per M. "What shall the harvest be?"

It is with sorrow that I report the death of the senior member of the firm of Aldridge Bros., Mr. Benjamin D. S. Aldridge. In his death the brickmaking industry has lost an honored member, and the community in which he lived, one that had an interest in their welfare, as he was one that followed the precept of the Bible, not letting one hand know the doing of the other, his many acts of kindness was known to but few. The church has lost in him an active and consistent member, one who was always ready to speak for his Master.

Information comes to me of the death of one whom I have known for many years, George S. Oldfield. My first remembrance of him was when he made brick with his brother John at Grassy Point. They have both joined the silent majority. So they drop, one by one on Life's fitful field.

Last December, I think it was, Mr. Lorenzo Van Buren, one of the oldest brickmakers on the Hudson left his home for New York to attend to some matters of business. The train had proceeded but a few miles when he expired. Last week his wife fell asleep in her chair to awake on the resurrection morn.

A. N. OLDTIMER.

Hackensack, N. J., April 14, '92

Employment of Women.

Editor Clay-Worker:

Although the few remarks regarding the employment of women, at the close of your correspondent "A. N. Oldtimer's" letter in November CLAY-WORKER, do not especially call for any notice, still, as the question is one of world-wide interest at the present time, a brief reference to it, may afford some of your readers an opportunity of giving their views and experience on the subject.

Some people seem to have the idea that women of the middle and lower classes should spend their lives alternating between the cooking stove and needle, etc. Though in no way advisable, this would perhaps be possible, for the women whose husband has a good situation, or whose father earns a comfortable living; but how about the widow and the orphan, who, perhaps, do not know "what they shall eat, and what they shall drink, or where withal they shall be clothed." The cooking-stove and the needle are very interesting to those who have a well supplied larder or wardrobe, but "man shall not live by bread alone,"—"nor women neither," and the advent of the sewing machine, etc., has very much reduced the size of the chorus, formerly necessary for a successful rendering of "the song of the shirt."

What then are these poor women to do? All thinking men are agreed that women should be, when necessary, a self supporting institution, though I do not think the most enthusiastic advocate of "Women's rights" ever proposed that they should have recourse to the "pick and the shovel" for that purpose; but men of the "A. N. Oldtimer" type, insist upon their being relegated to the domestic hearth—whether they have any domestic hearth to be relegated to or not,—and loudly protest against their finding employment in the ordinary fields of labor, however suitable that labor may be, and however "more expert and reliable than the men" they may be able to prove themselves; and if employed shall they take it for granted that it must be at a low price. "Cheap" is their motto.

In a former letter on this subject, I stated that I never had employed women in the brickyard. This is simply because my operations in this line are not sufficiently extensive, to supply steady work of a suitable description. In the departments where I have employed them, such as opening oysters, labelling cans, milking cows, working with bees, etc., they have always been paid by piece-work, and I have never yet found one, who could not easily earn, at more than the rate of the common laborer, and many of them three times that amount.

There are very few businesses, where employment could not be found for a certain number of women, with advantage to all concerned; not excepting that of brickmaking. R. M. GREER.

THE CLAY-WORKER.

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T. A. RANDALL & CO.,

81 Massachusetts Ave. Indianapolis.

TRUTH VS. UNTRUTH.

Many of our readers are doubtless aware that for months past we have been maligned by our only cotemporary in a most outrageous manner. We believe that his malice is so apparent that no one, except himself, is deceived or injured by the statements which are plainly false.

Henry Ward Beecher said: "It is better in business as in other things to tell the truth. A lie may mislead; for the time it may cover a weak point, but, in the end, truth will strip off the mask."

The business world in its great rush and whirl will at last take off its hat to the man who tells the truth. Some men are deceived by the old adage, "A lie can go round the world before truth can get her boots on." They want to travel fast, or appear to, and prefer the swift untruthful messenger. They are jealous, unprincipled, perhaps, and in constitutional make-up they are bad, but a keen business sense ought to teach them that, in the end, it is better to tell the truth than to strut one brief day under deceptive plumage.

A business man may have many faults, he may be imperious, exacting, uncompromising, and surly, but if he is truthful the business world will at last extend its hand to him cordially.

The business man who untruthfully says I have thousands when, in fact, he has only hundreds, may have a brief credit, but it will be brief: he may

have his day; but it will be but a day, in a business sense. The shrewd business world will find the real diamonds and prize them, and trample the imitations under foot, however much they may glitter for a time.

"Be not deceived, God is not mocked, whatsoever a man soweth, that shall he reap," is as true in a business sense as in morals or religion. The language of truth is simple, clear, explicit—it makes no vain display of its own merits.

Solomon says: "The lip of truth shall be established forever; but the lying tongue is but for a moment."

If our envious and misginded cotemporary could only comprehend these simple truths and try to follow them for a little while, even though he stumbled blindly at first, he would realize many advantages that he cannot hope to attain by his present course. An abiding success was never achieved by duplicity and mere pretense.

NONE TO WISE TO LEARN.

It is wisely said that one who knows the most can often learn a great deal from those who know much less. The great inventions of the world are not brought out by the greatest scientists. Thomas A. Edison was not educated in a Polytechnic Institute. He never went to college. Some of the greatest developments in photography have been brought out by amateurs who go blundering along into new and unexplored fields, and who bring out new and unexpected results. The Corliss engine was invented by a dry goods merchant.

These illustrations might be greatly multiplied. A great philosopher, who probably never invented anything but a wise statement, said that the reforms all originated outside the professions. Prison reforms are never inaugurated or brought forward by prison keepers. Hospital reforms are never brought out by hospital superintendents. Reforms in the law never originate in the bar. Altogether it is not the people who are possessed of the largest amount of academic information who move the world into new fields. It is as true in a brickyard as it is in other paths of progress. New inventions come from all directions, not from highly scientific men, but a little here and a little there. The man who drives a cart has an idea. Somebody else has another. A great principle is developed from an accident, and all unite in working out the details.

In the old countries, where all education is academic, where all machinists have the opportunity of advanced academic education, we do not find the same inventive spirit, the extended progress that is found in our own country, where nearly all inventive work is unsystematic, not technical, and which oftentimes is blundered into. No man is so wise, none so successful that he can afford to disregard that which comes to him from any direction, no matter how humble the source.

IMPROVED METHODS REQUIRE INTELLIGENCE AND CARE.

A friend once said to us that if the fool killer were to come around we might not all be killed, but some of us would be badly hurt. Sometimes the fool-killer kills himself; not very often, however. A man who lifts a cover from an oil tank and puts a lantern down in it to see how much oil is left is liable to kill a fool. Petroleum is now being largely used to burn brick, and from time to time accidents happen. It is ever thus. New inventions, new devices, added complexities bring about added hazards to life and property. If we go back ten, twenty or thirty years, or even ten, twenty or thirty miles, we will find a condition wherein a mashed finger or a sprained ankle are about the limit of physical injury. True, a man might have the top of his head kicked off by a horse, but this may happen any place, on a farm as well as on a brickyard. With steam machinery, petroleum as a fuel and the added complexities of later methods we find possibilities for greater destruction, accidents more severe, and results more disturbing.

The world moves. This is suggestive. As time moves on and we improve our machinery and our methods in brickmaking, we must also improve the character of service.

A man who is a good hand in a back number brickyard may or may not be just the one to take care of a more complicated plant. Cheap help, inefficient help is liable to blow up more oil tanks than the other kind. Intelligence is more careful. Intelligence costs a little more money, but it saves more and makes more. We want a man around a brick manufactory who knows enough not to stick a lighted lamp into an oil tank. He may know enough not to put his finger between two cog wheels, and yet not know a few common facts about the care of petroleum.

MAKE GOOD ROADS.

It is a gratifying feature of current thought and custom that in town and country so much of the accumulations of the thrifty is going into more comfortable homes. The log cabin was a necessity at first, but many a thrifty farmer in earlier times, turned his surplus earnings into more land to raise more corn to feed more hogs to make more money to buy more land to raise more corn to feed more hogs to get more money to buy more land to raise more corn to feed more hogs, leaving the family in the cabin not half as well cared for as the hogs, because there was less money in caring for them. But with rare exceptions that type of civilization has become a back number, and comfortable houses, with home equipments, such as carpets and books and pictures and musical instruments, now abound, while the comfort and health of farm animals are not neglected. But how about the roads? Have these been kept abreast with the other improvements of the town and country? Until very recently the basis of every road law has been the old law of pioneer times. Better laws now obtain, but the greatest drawback at present is the want of skill in properly expending the road funds. Men of no experience are put in charge of the work. Let every man interest himself in good roads. The merchant and the farmer are equally benefited by good roads and damaged by bad roads. Make good roads.

TALKING TOO MUCH AND TALKING BACK.

It was the most natural thing in the world for our brother, "Keystone," to imagine that some of the brethren of the convention talked too much. It was his first experience in such a body of born talkers. He will get over that when he shall have attended two or three more conventions, and himself have become the same terror to the inexperienced first-session members. These things grow on people as they grow older. It is like Congress in that particular. The new member who, in his rural district, lets his mouth off on every possible occasion, to the supreme delight of his country constituents, find when he gets into Congress that the old stagers have the advantage of him, and he is forced to be silent, when he would like to talk, particularly if he has any-

thing to say. However, "Keystone," in the February number of the CLAY-WORKER, speaks his mind, and those at whom he hurled his criticism talked back in the March number. These brotherly spats will do good all around. In the first place "Keystone" eases his mind. That has done him good already, and he will feel better when he meets his brethren again next year; and the offending brethren have had a talk back that sets them all right, so now let us begin at once to prepare for our next hand shaking and friendly interchange of experience. What if some seem bent on pressing upon the convention their special crockets, whether or no, the good sense of the convention, as well as its good humor, will sift the grain from the chaff, and in this instance even too much of a good thing will do no harm.

MY COUNTRY. RIGHT OR WRONG.

Of course some very good people will say they are for their country only when she is right, but they are the kind of good people who would see their mother belabored by a vagabond or a virago, and withhold assistance until they were right sure that she had not said or done or neglected something to provoke the quarrel. It is only the very good son that does that way, as it is only the very good citizen who withholds sympathy and support from his country until he is right sure that she is in the right, himself or his party being the judges, and in most cases it turns out that she is so much in the wrong as to not justify his active defense at all.

Two recent events in our National affairs have suggested this topic. Last year a mob assailed and killed some and wounded other American seamen in a port in Chili. The President sent word to the Chilians that that could not be allowed, and Chili answered: "But what are you going to do about it?" Whereupon Mr. Harrison telegraphed to the Navy to get her big ships and big guns ready and call on Chili, and see what she proposed to do about it, and they started off in a hurry Chiliward. About the time they got half way there Chili changed her tune and asked: "What do you want us to do?" and being told, she went to work and did it.

A little later Mr. Harrison asked Great Britain to help us keep the Canadians from stealing our seals up toward the North Pole. John Bull answered, "We are not right sure that you own these

seals; at all events, we will not keep our Canadian subjects out of the sealing waters." "Very well," said Mr. Harrison, "we will do it alone then, and if anybody gets hurt it will be because he puts himself where hurting is going on." Whereupon Mr. John Bull said: "If you mean business" (after that fashion) "we will see that our Canadian subjects let your seals alone," and they came down about as hastily from their high horse as our Chili neighbors did. Plucky little fellow is that Gen. Harrison, or rather the nation for which he is the official mouth-piece, for it was the president, not the man, who spoke on these occasions, the people back of him saying, "Our country, right or wrong." No wonder every American "is proud of such a country."

DEATH OF HON. GEO. S. OLDFIELD.

Hon. Geo. S. Oldfield, of Norfolk, Va., departed this life on the 29th day of March, from a stroke of paralysis. He was sixty-two years of age, an Englishman by birth, coming to this country when ten years of age. In his youth he engaged in the brick business at Haverstraw, N. Y., until the close of the war, and then removed to Norfolk, Va., where he established brick and tile works, and engaged in other mercantile pursuits. He was a successful business man. Besides, Judge Oldfield filled positions of trust in the city of Norfolk. Of late years, however, he has been out of politics, giving his entire attention to his business pursuits.

The leading business interest engaging the most of his attention was the manufacture of brick. The members of the craft who have attended the annual meetings of the National Brick Manufacturers' Association will remember the cordial greetings and words of experience by Judge Oldfield. In the future meetings we shall miss our esteemed friend and brother of the craft.

The local press of Norfolk pay him the high tribute of being an upright, enterprising citizen, an affectionate husband and kind father.

A DISCLOSURE.

With the 18th number of the valuable papers on "The Fuel Question" which appears on a preceding page, the series is brought to a close, and the identity of the author is disclosed. Some of our readers may be surprised to learn

that "Hydro-Carbon" and Wm. Waplington are one and the same. We are pleased to give Mr. Waplington the full credit for his able papers which we feel sure have been read with much interest and profit by very many of our subscribers. With the next (May) issue of the CLAY-WORKER Mr. Waplington will begin a new series of papers entitled "Chemistry for Clayworkers," and it's not necessary for us to add that the subject will be handled in such a plain practical way as to prove both entertaining and instructive.

A SUCCESSFUL COMBINATION.

Skill, experience, energy and capital have combined to make the Boyd Brick Press the best machine in the world for working all kinds of brickmaking materials; and making brick for all purposes. Such a combination can not be beaten.

CAUSE AND EFFECT.

A great many people don't know what they want in this world until they see it advertised; other people know what they want, but don't know where to get it. Advertising tells them. My wife is perfectly contented with her outfit until she takes up an evening paper and finds that Lord & Taylor have a fine line of silks on the bargain counter. Immediately she needs a new garment, and my bank account goes down accordingly.—*George W. La Rue.*

WHITE AND COLORED ENAMELED BRICK.

Recipes for all Enameling and Glazing Materials and Full Instructions for Their Practical Use

The writer of the series of articles on "Enamelled Bricks," that have appeared in the CLAY-WORKER, is prepared to sell the recipes for ivory and cream white enamels, with working drawings of a kiln, specially designed by the writer, in which to burn these goods. Also, recipes for glazes and enamels for all colors, together with a comprehensive and complete formula for the manufacture of white and colored enameled brick. He will also supply all materials to make up these recipes for ivory and and white enamels at nine pounds (\$45) per ton, including package in quantities of not less than two tons carriage and freightage charges forward at consignees risk. He will also supply recipes for the most beautiful glaze for ridges and

roofing tiles at small cost; black, brown or stone color with full and complete direction for their application and glazing materials for all purposes direct from the manufacturer. For samples of these beautiful enamels, write R. M. Greer, Tuxpam, Mexico, and Mr. O. B. Wheeler, Biltmore, N. C. The editor of the CLAY-WORKER will give my address to any one desiring it.

MANAGER.

AN INVITATION.

Those who want the best Dry Press Brick Machine in the market will not fail to investigate for themselves. To all such we extend a most cordial invitation to visit Chicago and see the Boyd Presses in operation in all stages of manufacture; also our system of preparing and handling clay and making Dry Pressed Brick.

Those who come here and go through our extensive works need no arguments to convince them of the superior merit, simplicity, economy and durability of our machines and our process. All who call at our office, 320-326 Dearborn St., will be heartily welcome, and we will take pleasure in showing them through our works and explaining our system in detail.

CHISHOLM, BOYD & WHITE.

ONLY \$3.65

To Chicago By the Ever Popular Monon Route.

The only line running dining-cars; an elegant dinner for 75c.

The only line running Pullman vestibuled trains, heated by steam and lighted with electricity. An elegant Pullman sleeper leaves every night for Chicago; the same stands at west end of Union station, and can be taken at 8:30 p. m. Fast vestibuled limited, with dining-car attached, leaves at 11:35 A. M.; arrives at Chicago 5:20 p. m. Night express vestibuled limited leaves at 12:40 A. M.; arrives at Chicago at 7:35 A. M. Chicago terminal, Dearborn station, Polk street, two blocks from the Auditorium, Grand Pacific, Board of Trade. The only line landing you in the heart of the city.

Ticket offices 26 South Illinois street, Union station and Massachusetts Ave.

I. D. BALDWIN, D. P. A.

MENTION THE CLAY-WORKER

When writing to Advertisers

MENTION THE CLAY-WORKER

EDITORIAL NOTES and CLIPPINGS

Sidney, N. Y., wants a brick plant.

North Augusta, Ga., is to have a large brick plant.

New Albany, Ind., is to have a paving brick factory.

Jas. McNeen is building press brick works at La Junta, Colo.

The Ducktown (Tenn.) Fire Brick Co. will build a plant near that town.

W. G. Lowell, of Brewer, Me., will establish a brickyard at Guilford.

M. S. Smith, Rolling Prairie, Ind., wants a horsepower tile machine.

A. E. Oak, of Cambridge, Ill., is looking for a good ditching machine.

Minneapolis, Minn., is laying vitrified brick on Fourth St. as an experiment.

The Gainesville (Tex.) Press Brick Co., has been incorporated; capital \$24,000.

The Portsmouth (O.) Red Brick Co. has been incorporated; capital \$10,000.

The Keystone Fire Clay Co., New Lisbon, O., has been chartered; capital \$25,000.

A. Harrison, 624 Vance St., Toledo, O., wants to purchase terra cotta and tile machinery.

Ralph Spencer, of Frazeysburg, and others, will establish brick works near Dresden, Ohio.

Henry Strong, Sr., aged seventy-four, a pioneer brickmaker of Doylestown, Pa., died the 21st ult.

W. L. Binkley, of Centralia, Wash., will probably add a press brick equipment to his works.

The Westfield (Mass.) Brick Co. are investigating the paving brick interests and may erect a plant.

The Renova (Pa.) Fire Clay Works will add new machinery and materially increase their capacity.

F. A. Jordan and others, of Pownal, Me., have organized a company and will erect a brick plant there.

The South Milwaukee (Wis.) Brick Co's plant is to be remodeled and equipped with new machinery.

The Chicago Brick Manufacturers have formed a new local organization for mutual benefit and protection.

Howard and George Little, of Xenia, O., have purchased clay land at Yellow Springs and will erect a brick plant.

Benj. D. G. Aldridge, a well known brick manufacturer, of Dutchess Junction, N. Y., died March 26, aged fifty-two years.

The Youngstown (Ohio) Paving Brick Co.'s works were burned March 30. Loss \$20,000; insurance \$5,000. They will rebuild.

The Hutmacher Brick Co., Quincy, Ill., has been incorporated by Jno. Robertson, Ed. J. Hutmacher and G. F. Jasper; capital \$10,000.

A. B. Jones is going to establish brick works at Guntersville, Ala., and is now having the clay tested to determine the best process to adopt.

The Elizabeth City (N. C.) Brick Works has been organized; capital \$40,000. They will erect works with 25,000 a day capacity.

Jas. Prutzman's brickyard at Muncie, Ind., was partially burned the 18th inst. Loss \$1,500; no insurance, policy having expired a few days previous.

Henry B. Boyer and J. W. Foreman, Pottstown, Pa., have purchased Jos. McK. Potts' brickyard and will at once overhaul and put it in operation.

Dan'l J. Haight, at one time one of the most prominent brickmakers on the Hudson, died March 15, at his home in Peekskill, N. Y., aged 74 years.

The Briggs Brick Co., Camden, N. J., has been incorporated; authorized capital \$150,000. Jos. S. Briggs and others, of Philadelphia, are interested.

E. M. Freese & Co., Galion, Ohio, write that so far this season their trade has been remarkably good and the prospects are excellent for a very busy year.

Jas. Means & Co., have the contract for the machinery for the mammoth new brick and sewer pipe works of the Streator Clay Mfg. Co., Streator, Ill.

The American Fire Clay Co., New Cumberland, W. Va., has been awarded contract to furnish Louisville, Ky., with 1,700,000 paving brick at \$13 per 1,000.

The Logan (Utah) Brick, Pipe and Tile Co. has been incorporated. T. B. Cardon is president, J. E. Wilson, treasurer, and Jno. A. McAllister, secretary, J. C. Globe, superintendent.

One of the boilers at the works of the Laclede Fire Brick Co., Cheltenham, near St. Louis, exploded March 21, damaging the works to the extent of \$20,000, killing five of the workmen and seriously wounding several others.

The Central City Brick and Tile Co., of Peoria, Ill., has put in a four mold new improved Simpson Brick Press and complete equipment for manufacturing by the dry clay process, furnished by D. B. Drummond & Co., St. Louis.

Aaron French, of Pittsburgh, and Capt. Nelson Mackey, of Galveston, Tex., have purchased a large tract of land near the latter city on which there is an inexhaustible deposit of potters' clay. Large brick, tile and sewer pipe works will be established.

D. B. Drummond, Agent for the Simpson Brick Press and Williams Cyclone Pulverizer and Machinery, has completed a sale to Rapid City Steam Brick Co., Rapids City, South Dakota, of one 4-mold Simpson Brick Press, one Williams Cyclone Pulverizer and other machinery.

The Purington Brick Co., of Chicago, has been incorporated by D. M. Bell, T. S. Dobbins and Chas. S. Purington; capital \$100,000. "Charlie" is a brother of D. V. Purington, President and Manager of the well-known Purington-Kimbell Brick Co., and was formerly connected with the May-Purington Brick Co.

F. G. Slate, of Ft. Dodge, Iowa, has a tract of valuable clay land well located near a good market. Parties desiring to establish a pressed brick plant may learn of an excellent site by communicating with him. The clay has been fully tested in a practical manner, and proven of remarkable fine quality for front or ornamental brick.

Mr. A. R. Batley, New Castle, Pa., writes that he has taken charge of Mr. M. S. Marquis' Fire Brick and Terra Cotta Works at that place. They are just putting in a Frey-Sheckler No. 2 Giant Brick Machine, large pug mill, dry pan, new 80 h. p. boiler, steam dryer, also building six round, down-draft kilns for the making of paving brick. They have a fine material for pavers and will make about 35 M per day. Their output on fire brick is about 10 M per day.

M. F. Williams & Co., St. Louis, write that they are having a very satisfactory trade. They have recently filled orders for Pulverizers and other machinery for parties in La Junta, Col.; Ft. Smith, Ark., Springfield, Ill., Manatoneck, Wis., La Salle, Ill., Coaldale, Ala., Massillon, O., Huntington, Tenn., Toronto, Ont., Pueblo, Col., Milwaukee, Wis., Chicago and Glenn Carbon, Ill.; and in addition have furnished complete brickyard outfits for

the McGregor Press Brick Co., St. Louis, Henry Brockschmidt, St. Louis, and the Sparta (Ill.) Brick Co. Inasmuch as Messrs. Williams & Co. confine their advertising entirely to the CLAY-WORKER, this is a very good showing, we think.

The Ruby Pressed Brick Co., of Lockland, O., has started, and the indications are that they are going to make a very superior grade of front brick. They have one of the improved Lion Machines which removes the seam entirely from the center of the brick, and at the same time the brick is equally pressed from both sides. This they claim no other machine does. They also have the Griswold Down Draft Kiln, the same that has been used with such good results at Zanesville, O. It would pay those who contemplate starting a pressed brick works, to go and examine the Ruby outfit.

The stockholders of the Brooke Terra Cotta Co., of Wellsburg, W. Va., met April 2, and elected directors as follows: Chas. W. Franzheim, M. L. Ott, T. W. Carmichael, James Paull and F. M. Strong. The officers of the company are Chas. W. Franzheim, of Wheeling, W. Va., president; and Wm. C. Jacob, of Wellsburg, W. Va., secretary. The plant will be located just north of the Wellsburg city limits. The company will put in a four mold dry press brick machine with corresponding machinery, and, later, will manufacture fine-art terra cotta for which the clay is especially adapted. The capital of the company is \$30,000 with the privilege of increasing to \$500,000.

The brick industries in Ft. Dodge, Ia., and vicinity are quite prosperous. Our correspondent there writes that Dr. Kime added an Andrus dry press to his plant last fall, and starts the season with numerous sales and orders, and is confident of being able to make a good pressed brick. Thiede & Heilman have placed a Boyd press upon their already extensive plant, and will push their work to its utmost capacity, and, with last year's stock sold out and plenty of orders, are likely to have a successful season. Mr. Bradshaw also reports prospects of a busy season, and is pushing the work. Another enterprise on a large scale is in embryo, and may be reported later. A stock company has been organized at Lehigh, with cash capital of \$20,000, with power to increase to \$100,000, with Mr. Burnham, of Mil-

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ANTHONY ITTNER,

MANUFACTURER OF

ST. LOUIS AND BELLEVILLE PRESSED AND ORNAMENTAL BRICK.

OFFICE ADDRESS:

ANTHONY ITTNER, Builders Exchange, Telephone Bldg., St. Louis, Mo.
St. Louis Works, California Avenue Belleville Works, L. & N. R. R. near
and Sidney Street. Belleville, Ill.

Fine Press Brick, 10,000,000	Total Yearly
Ornamental " 2,000,000 "	Capacity:
Common Press " 15,000,000 "	27,000,000.

Our Press Brick have sharp and well defined angles, and are free from the objectionable mark or streak, so frequently seen running lengthwise through the face of the other dry clay brick, and commonly called "granulation."

The color of our brick being a beautiful dark cherry red, equal to any manufactured in this country.

The Dies we use are a Patent of our own devising, in which the liners can be renewed at a trifling cost, hence we have no occasion to let the liners become so badly worn as to mar the corners and edges of the brick.

We also have a PATENT REVOLVING UPRIGHT STEEL BRUSH PULVERIZER, which leaves the clay loose and flaky, a condition so favorable for making a solid uniform homogeneous brick, which, under the trowel, can be cut into any shape without breaking.

Ours is the only DRY CLAY Brick Works in the United States that harvests and gathers the clay in its depth, thus securing a standard, uniform brick, year in and year out, continuously.

The results of the above advantages are accounted for and seen in the following certificate, which speaks for itself:

MESSRS. ITTNER BROS., St. Louis, Mo.

BOSTON, Feb. 15, 1889.

GENTLEMEN:—We have carved the brick panel you sent us and ship same to you this day. Although we have had a large experience in brick carving, we do not hesitate to pronounce your brick the best for carving purposes that we ever used. Yours truly,

EVANS & TOMBS.

We keep large quantities of Press Brick in stock, and are prepared to fill large orders on short notice. We pack them carefully in straw, so that they can be shipped long distances without material damage.

BOOKS FOR BRICKMAKERS.

It is pretty generally conceded that wonderful progress is being made in the ancient and heretofore unprogressive art of brickmaking. Among the best evidences of this is the fact that the brick-making craft is no longer without a literature of its own. There are now some good practical books treating on the manipulation of clay—the making, drying and burning of brick. The list is not so large but that every brickmaker can afford to have them all. Get them and read them.

"BRICKMAKER'S MANUAL,"

Morrison and Reep, \$3.00

"BRICKMAKING AND BURNING,"

J. W. Crary, Sr., 2.50

"TABLE OF ANALYSES OF CLAYS,"

Alfred Crossley, 1.00

"DURABILITY OF BRICK PAVEMENTS,"

Prof. I. O. Baker, .25

Mailed, postage free, on receipt of price. All of them to one address for \$5.50. Address the publishers, T. A. RANDALL & Co., Indianapolis, Ind.

THE CLAYWORKER.

THE OFFICIAL ORGAN OF THE NATIONAL BRICK MANUFACTURERS' ASSOCIATION OF THE UNITED STATES OF AMERICA.

VOL. XVII.

INDIANAPOLIS, IND., MAY, 1892.

No. 5

Written for the Clay-Worker.

A SPECIMEN OF GERMAN BRICK ARCHITECTURE.

THE design which we publish herewith is of a brick bank and office building, in the little city of Halberstadt, Germany.

A careful examination of the design will indicate how fully brick may be employed in a first-class architectural structure. We see here columns, round and octagonal, frieze, architrave and other features carried out wholly and consistently in brick. It is easy enough to measurably imitate any design that may be made in brick, but doing it in an artistic and perfectly natural way is quite a different affair. In this Halberstadt building it could not be said that any particular effort had been made to use brick rather than some other material. Brick, in this structure, appears to be the natural material, not alone from the standpoint of design and appearance, but constructively. Here is a building that has been in use some hundreds of years

It is, constructively, good; no fault may be found with it. If the design had been forced and the forms warped to suit the material used, it would show in the construction; it would show defects. We would see where it was beginning

to let down. Not so here, however.

These people do not use brick simply for the sake of using that material. They are not making an advertisement of ornamental brick work, or brick patterns. They use brick in these forms

because it is less expensive, because they can get good brick easier than they can get good stone. This is a good and highly justifiable reason for the exclusive use of this material. One sees, in many sections of the world, ornamental brick patterns, ornamental brick buildings, which are a discredit to the clayworker. We see incongruous designs, wild mixtures of everything which may be done in brick—a kind of brick gymnastics. There seems to be no settled purpose, unless it be to do everything—to show a variety without consistency. How often do we see one kind of a panel here, and a different kind somewhere else; a string course of a kind on one floor, another kind on another; variety without reason; differences without con-



A GERMAN BANK AND OFFICE BUILDING.

sistency, than which nothing can be more ruinous to good design. We have buildings of that kind in our own city; designs in which there are neither rest nor repose.

In publishing this design and the description which goes with it, I wish particularly to impress the idea that ornamental brick patterns, or brick construction, which are out of the usual line, should not be considered or thought of excepting in a proper rational spirit. Brick design which is merely an exhibition of variety does not reflect credit to the brickmaker or the architect, and does not secure favorable public opinion. A few good designs like this one would do a great deal for the cause of good ornamental brick building. It is not a pretentious design. It has practically nothing to offer in the way of novelty, but it is straightforward, sensible and artistic.

A very eminent architect has said that the proper solution of any building problem always appears the most natural one possible; that when one labors over a design for days and weeks, and produces the correct thing, the result looks so straightforward, so proper and so simple, that he is provoked that he did not think of doing it that way at first. It is true in art design as in other things, that success rests on a few general principles, and that the general tendency of the world's work is in simplification.

It is not alone the general outline and ordinary treatment from standpoint of outline which makes this building a success. One might take the same general outline, construct it less carelessly with respect to details, and have an artistic failure. But when we look at the mouldings and the decorative work, we find that the hand of the artist is shown in their fineness and delicacy, so that we have, not alone beauty of outline, care for constructive details, study of the mass, but also a fine distinguishing feeling for little things; hence, a complete and consistent design. Such buildings do much for the general advancement of all things architectural, and reflects great credit to the art of brick building.

THE EDITOR'S SWEETHEART.

The editor's sweetheart's eyes are bright,
As she dons her dainty dress
And smooth the waist and hooks it tight,
For her lover is coming to see her to-night,
And her form is going to press.

—New York Press.

Written for the Clay-Worker.

PRACTICAL POINTS ABOUT PAVING BRICK.

IN GENERAL.

HARD burned brick, such as are best suited for paving are the product of chemical and mechanical changes under great heat. They may be considered as similar to igneous rock, lava or cinder.

This is a safe statement because of the great diversity of forms under which these things appear. Good paving brick may be considered as practically indestructible since they are not acted upon to any degree appreciable by air, water or such acids and disintegrating influences as are likely to be found in the street.

Common building brick are quite unfit for the purposes as they soon show the effects of wear, but good hard brick made of the proper material are giving general satisfaction and have done so for the last century in Holland.

A good paving brick should be homogeneous and dense. These characteristics can only be obtained by thoroughly preparing the clay and forming the brick under great pressure. They should be hard, tough, tenacious, strong and as nearly impervious to water as possible. These conditions can only be obtained by using a clay containing suitable ingredients, and by burning it properly and carefully annealing after the burning is done.

SIZE AND FORM.

Some manufacturers have made paving brick with edges rounded off thinking to make better footholds for horses and to prevent the corners from chipping. There are objections to this practice, among which may be mentioned its uselessness in view of the fact that brick pavements are not slippery, and the seams between the brick as ordinarily made are distinct and marked enough, as has been demonstrated by experience, to furnish all necessary footholds. As a remedy for or preventative of chipping it is probably more objectionable than beneficial since it introduces the feature that it is intended to remove, that is the deficient or imperfect corner and thus in a measure destroys the smoothness of the pavement. Another objection to rounding the corners is found in the difficulty in disposing of the brick to be found in every kiln that are not properly or sufficiently burned to make good pavers.

In this is found a good reason for making paving brick of the same size and form as those of ordinary building brick. Many manufacturers have aspired to make large paving blocks but the practice is probably not profitable to the manufacturer, nor are the blocks likely to give satisfaction in the pavement. Great difficulty is met in drying and burning large blocks properly, they find no market if not properly burned, as they can not be put to any other use.

Being of an odd size and shape they can only be secured from one place. The supply may be limited. A difficulty may be met in getting pieces for repairs in after years, and they furnish fewer seams and a more unsatisfactory footing for horses, besides being more liable to break and tip out of position.

Orders for paving brick are usually large, and are given with short notice, and are required to be filled within a short time, thus over taxing the capacity of the manufacturer of special forms and sizes.

COLOR.

While it is probably true that a very large per cent. of the paving brick made are of a dark color it is by no means true that this dark color is a characteristic of all brick suitable for paving, and it would be unwise to condemn brick for paving purposes simply because of their color.

All clays change color more or less in burning, and the degree to which the clay has been burned is indicated by the different shades and tints. Since different clays take on different colors no particular color can be taken as a standard by which to judge of the burning of all clays.

GLAZE.

The glazing of brick to be used for paving is objectionable and should be discouraged. A glazed surface adds nothing to the value of paving brick but is open to several objections. It tends to make the brick slippery by destroying the velvety surface, changes the color and makes them appear harder burned than they really are. It fills cracks and smooths the surface thus adding to the appearance of the brick, and tends to deceive the eye without adding to the quality. Glazing must not be confounded with vitrification and hard burning. While a clay that will, if required, take a salt glaze will probably make a good paving brick, the value does not lie in the glaze but in

the characteristics of the clay as indicated by the possibility of taking the glaze.

(To be Continued.)

Written for the Clay-Worker.

HINTS ON BRICKMAKING No. 63.

BY. R. BRICK.

SETTING UP MACHINERY.

IN setting up your brick machine, or crushers, puggers or disintegrators, the first thing to do is to prepare a good solid foundation; go down to solid clay, if there, for a bottom. Then put in a heavy brick wall, well laid in lime mortar or cement; place upon this, heavy oak timbers. Have these plumb, square and level, and bolt the machinery firmly to these timbers. You will not only have them right at the beginning, but they will remain that way.

A machine may be plumb and exactly in line at the start, but without a good and sufficient foundation one part will settle, and the gears, and journals and bolts, become strained, and bearings out of line. This causes unnecessary wear, and requires more power to drive them. This want of good foundations, and the bad results that follow, is the main cause of unusual wear and breakage. The same advice will apply to line shaft. It must be put up level and straight, and trestles placed on foundations so it may remain right. Machines and line shafts must be in line, in order to have belts run on center of pulleys. When they are once in line and on proper foundations, there will be no trouble to keep them so.

The next point is proper daily care of machinery. All bearings must be lubricated well to keep them from heating and wearing. In many places the compression cup and jelly-like lubricant for them, are economical and reliable. Another thing to do, is to keep all bolts tight. Don't allow a bearing to run loose in a box; take out the liners and keep the cap tight and rebabbitt when necessary.

When your machine makes any unusual noise, try to find the cause. If you cannot, at first opportunity examine the bearings and cog gear and you will find bolts loose, or some bearing running dry and wearing. All boxes and cog gear should be protected by sheet iron covers

from clay and dust. Most modern machines are thus protected. A cheap grade of oil will answer for line shaft and machine bearings, but for engine, good engine oil should be used and for cylinders the best grade of cylinder oil is cheapest. Just here, will say, that it is also necessary to have a skillful engineer to apply the oil and to keep all the parts in order; he should also see that all machinery, as well as his engine, receives proper attention. He should have a forge and anvil and do simple jobs of smithing, such as welding or straightening bolts and rods. This often saves valuable time, as well as money.

A stock and dies for thread cutting is



G. C. STOLL, SEC'Y ILL. T. B. & D. ASS'N, LEXINGTON, ILL.

a most convenient thing to have, and does not cost much. There is a great deal of simple repairing that can be done quickly and cheaply at the works, and tools necessary to do it should be purchased and made part of your plant equipment. It is not the first cost of these tools, so much as losing and carelessly breaking them that makes them expensive. A tool house, then, with lock and key, is necessary, and one of the first things that should be built, and all tools when not in use should be kept therein. They will not only last longer, but much valuable time, often lost in hunting for tools, is saved. There are some men that would much rather hunt for tools

than to use them. They will wander about with a troubled countenance, looking carefully for some tool, and hoping just as earnestly that it could not be found for a half hour at least.

The making of bricks should begin as early in the spring as practicable. The bricks, during first season, must be dried by natural heat and air, and burned in temporary or casing kilns. This can be done very well first year. Any bricks damaged by rain while drying can be put into the kiln, and when burned can be piled aside for use in building artificial dryers and permanent kilns, and any bricks damaged in the arches by burning in the casing kiln can be utilized in the same manner. In our next article we will offer some advice about settling, casing and burning a kiln with temporary walls or casing.

A WORD ABOUT KILNS.

IT is not our purpose to indicate a particular kiln as the best for making tile, but suggest two or three points that kilns should possess to be successful in burning good ware.

1st. A kiln should be substantially built, with good thick walls, resting on solid foundations—walls so thick that the outside temperature will not effect the burn—substantial, that they may last for years. It is wise economy.

2nd. The kiln should be so constructed as to distribute the heat equally through the ware. Besides, there should be provision for controlling, or changing the heat currents, if the necessity should arise, so as to increase the degree of heat where it is desired and decrease it at some

other point, or hold the heat at pleasure.

3rd. Economy of fuel is important, but economy at this point at the expense of poor burns should be avoided. It is well to remember that it requires heat to bake the ware, and heat is generated by the combustion of fuel, of some kind. The most perfect combustion of fuel is an important question, a subject demanding much thought, close observation and much care. We have much yet to learn at this point.

Lastly, every burner should study to show himself approved in handling a kiln to the best advantage, so as to get the best results—not tinkering with it, but in giving the work his best thought,

and close observation, as well as muscular effort.

No burner should be content to fill up the fires, then sit down and chew his tobacco until they need to be filled again, without so much as giving a thought to the business. A good burner is another important point in the use of a kiln.—*Drainage Journal*.

BRICK PAVEMENTS IN PHILADELPHIA.

STREET paving has been a vexed question with the municipal authorities for years. This is especially the case with streets in the suburbs. It has not been an easy task to find a material, combining utility and cheapness, which would prove alike satisfactory to the authorities and the residents. However satisfactory the Belgian block may be as a material for the heavily travelled avenues in the centre of the city, it is now generally admitted to be unsuited to the outlying districts, notwithstanding the not unreasonable first cost of paving and the minimum expense of keeping such a street in repair. Streets so paved are objectionable from the noise created through wagon wheels rolling over their uneven surfaces, their unsightly appearance and the difficulty in keeping them clean.

At first thought macadam seems the perfection of paving. Its first cost, which averages \$1.85 a square yard, including block gutters, appears reasonable, and when newly laid, it is smooth, pleasant to drive over and easy on horses. But a little experience with this kind of paving has taught most people that, however desirable it may be in some climates, it is utterly unfit for that of Philadelphia as a permanency, no matter how well laid. Unless persistently sprinkled, the dust arising therefrom in summer is almost unbearable, and in spring and autumn this dust is converted into a disagreeably pasty mud. But this is not all. Macadam roads wear out with such rapidity that it is estimated in less than fifteen years the cost of repairs, if made as needed, will exceed the first cost of building. On this account Councils will now rarely authorize a macadam road unless the property owners along its line give bond to not only pay all the cost, including intersections, but to keep it in repair thereafter, and to pay their proportion for an improved pavement when that may be ordered.

Of late years two other materials, sheet asphaltum and vitrified brick, have been considered, and tried in the city and suburbs. Each has its ardent supporters, but there seems some doubt whether sheet asphaltum, as laid in this city, or, indeed, anywhere in this country, is the best pavement to put down. Outside the first cost, which is about the same as for Belgian block, there are complaints of it from many sources. In wet or frosty weather it becomes so slippery as to be difficult for horses to keep their footing. Its substance is such that ammonia, lime and even water will rot it, rendering frequent and costly repairs necessary; nearly as costly, in fact, as macadam. From these objections vitrified brick seems to be comparatively free. Not only does it present as handsome an appearance as sheet asphaltum; but it is nearly, if not quite, as noiseless as that material. Neither does frost or rain appear to hinder a horse from travelling over it easily and safely. As far as can be learned, in every case where streets have been paved with vitrified bricks—and there are many in West Philadelphia and Germantown, besides some in other wards, it has met with universal popular approval. As it has been less than five years since this material was introduced into Philadelphia, there is no data as to what the cost of repairs will be, but from the evidence of other cities in the West and Southwest, where it has been in use for many years, the cost of keeping such streets in order is less than for any other material ever used in those sections except Belgian blocks.

The first cost of laying brick pavements, which ranges from \$1.90 to \$2.20 a square yard, but little more than that of macadam and much less than Belgian block or sheet asphaltum, is another strong argument in its favor. From the appearance of most of the streets in the suburbs of Philadelphia, paved with brick, a stranger would suppose they had been just completed, and they really seem as though they would not need a dollar expended on them for repairs in many years. If this be the case, and there seems little reason to doubt it, this pavement would seemingly be not only the most desirable pavement for the suburbs, but worth trying extensively in the older parts of the city, as it was been successfully for more than half a century in the heart of Antwerp, and in many cities of Holland for over a century.—*Ledger*.

ARTIFICIAL DRYING.

*BY MAX WOLFF.

IN all the various channels which go to make up the brick trade I do not think there is any one so important and so little known of as the subject of *perfect drying*. This subject, which your convention has assigned to me and to which I feel honored to respond has occupied the minds of the very best men in the business, and to-day we are all as anxious to secure a correct solution of the problem as we were years ago. It is unnecessary for me to state in this short paper the many and varied reasons for the drying of brick. It cannot be maintained for one moment by any fair-minded man but that the day of sun-drying is gone, never to return. Rapid progress in the manufacture of brick, the application of the latest improved machinery, the addition of the most perfect appliances ever used in a brick-yard, all symbolize rapid advancement, and the man, or men who fail to avail themselves of the latest improved machinery are apt to find, at the end of the year, a balance on the wrong side of the balance sheet.

The question is, how can we best dry our brick artificially? There are a number of systems in use now, and each method has a number of followers. The solution of the drying problem will remain a mystery as long as different men entertain different ideas. You know, and I know, and every practical brick manufacturer knows, that the drying of brick is simply a method of reducing the evaporation of the clay in excess of that contained in the atmosphere. Of course this produces an irregularity which is made manifest in the burning. With brick dried by the artificial system this important feature is obviated and in consequence the brick is left in the very best shape to be put in the kiln for burning. Artificial drying is a component part of a perfect brick plant. I know the claim has been made, and is at the present time, that artificial drying is unnecessary and that the brick can be set direct from the drying sheds as economical and thoroughly dried as from the dryers. This I think is certainly an erroneous idea. In the first place the different clays which have to be handled are not all susceptible to the same radiation of heat, and for this reason are not as easily

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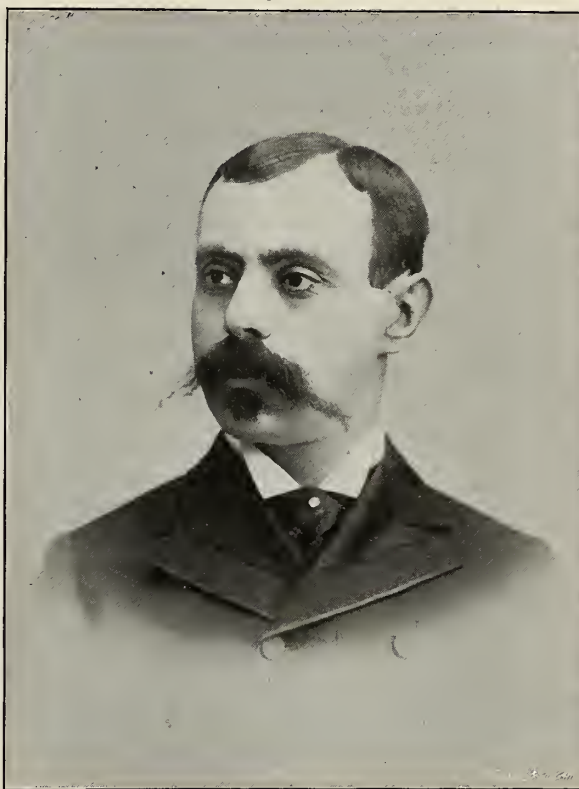
dried as the average layman thinks. Different clays require different handling, and, gentlemen of the convention, that is the key-note of the situation.

The advocates of the open air dryer and other systems are all well enough, as far as they go—but in this case causes the handling of the brick, in itself no unimportant feature. Wheelbarrow handling has to be adopted, and this, you all know, is a relic of antiquity as compared with the modern brickyards of to-day. Artificial drying has come to stay, and the plants or men that persist in relying upon nature to dry their products will be included among the "back numbers" at an early day. Most people have an idea that it requires but little wisdom in drying brick—indeed, I know of no other occupation where the common fallacy of "no skill" is necessary, as in the brickmaking industry, and how short-sighted such a policy, and how dearly have some of the manufacturers paid for their "skill."

But what we want to discuss now are dryers. I do not desire to pose as an expert upon this subject, but will plead guilty to being an enthusiast. I do not think that open-air dryers are any saving to the brick manufacturer. They take up too much space. You can form no idea of the amount of space it takes when you have to dry many thousand brick a day. If you hack up the brick on pallets on the floor it takes a long time. Then, again, you have no hacking space, and this has been urged as a most potential argument against the open-air dryer. For a very small plant a dryer of this description might be used with some good results, but in a large yard, where the output daily amounts to many thousands, the question of an open-air dryer—considering the many times the brick have to be handled and the extra labor necessary—is certainly a luxury that is not productive of any great benefit to the owners.

The tunnel system, which is a combination of the drying floor and other attributes of steam drying, seems to me to be the one best adapted for use by brick manufacturers. The nearer you get to nature, the better will be your results, is an old saying, but at the same time we are all aware that there are some natural things that check the progress of drying. For instance, in some

parts of the West there is clay that can not possibly dry in the open air without checking or cracking, and this clay it would be foolish to handle. But I believe, and I think the members of the convention will agree with me, that with the system of drying which we use to-day, the most refractory clay can be thoroughly dried by the tunnel system, and the brick sent to the kiln dried almost of anything that betokens a predisposition to soaking. Another, and to most brick manufacturers an important feature, is the *time* that a plant can put in having a first-class dryer. With a good dryer there is no reason why any good brick plant cannot work ten



MAX WOLFF, PRES. IRON CLAD DRYER CO., CHICAGO.

months out of the year, while, according to the old method, the best they could ever do was to work five months.

Laboring men are more easily secured at a plant where they have a good dryer. They know that for ten or eleven months of the year they will be enabled to obtain steady employment.

Another feature of the dryer system consists in the fact that while the plant may be equipped with one machine and a dryer, yet the capacity of the plant will be almost twice as much as if there were two machines and no dryer. This speaks for itself.

Of late years the attention of the trade has been more or less attracted towards

paving brick as the roadway of the future. It is doubtless true that more energy and money has been directed towards the achievement of this particular feature of the brick industry than any other, and it is coming. Cities, towns and villages all over the West and Northwest are adopting this as the true commodity for roadway traffic. These pavers must be dried and the question is, how? Well, I will tell you. No vitrified brick that was ever made can be dried thoroughly in any other way than by artificial drying. It is out of the question to think otherwise, and I am sure you will all agree with me on this point. I know myself of several attempts that were

made to dry vitrified brick by other processes, and in each instance a signal failure was recorded, and, gentlemen, I, assume it will always be so recorded unless the manufacturers of the pavers come to their senses regarding the drying of them.

In placing a dryer in a plant, great care should be taken that its location be as close to the machinery as is possible. The less turn-tables and transfer cars you have, the easier the plant can be run. Of course, this last remark applies to old yards, whose plant is more or less regulated by the position of the machinery, and in such cases large numbers of transfer cars are required, and the handling much more laborious. But in new plants this obstacle can be overcome, and the dryer put in such close proximity to the machine as to obviate all possible extra labor.

The steam dryer, as now used, has demonstrated, beyond the shadow of a doubt, that it is the very best thing for the brick manufacturers. The heat is not so intense as to melt the brick or bake them, and they are dried nicely with a smooth edge, evenly and with a good ring. The drying is gradual, and the water smoke is drawn off as rapidly as made. In the tunnel dryer, if the brick are properly set, there can occur no cracking, and the more heat obtained, the better for the brick.

Everybody who has had any experience will tell you that the time most profitable for artificial dryers is in the spring and fall of the year. But, unless the weather is so severe as to rush the thermometer away down below zero, a plant with a good tunnel dryer can work

all the year round and have brick always on hand. There can be no question but what artificial circulation is necessary to the successful drying of bricks. This fact has been demonstrated time and again, and the stack system has always been of practical use to the brick manufacturer. The tunnel dryer, such as I have mentioned, seems to me to be the only successful one. It saves a great deal of work, and it can always be depended upon for dry brick, which you cannot claim by any other system. Then again, the cost enters into the argument at this point, and the comparison between drying brick in kiln and in the dryer is at least 75 per cent. in favor of the dryer.

The question as to how long it might take to dry brick thoroughly, so that they may be ready for the kiln, is one upon which there are a number of contrary opinions. In my judgment there are few clays that cannot be safely dried in less than from twenty to twenty-four hours. Of course I know where there are instances in which the brick have been thoroughly dried inside of twelve hours. In Chicago there are some clays that can be dried very quickly, but I am inclined to the opinion that twenty-four is the limit. In that period of time the entire middle will be thoroughly dried without any danger of cracking, or any defect in the brick. The question of fuel for use in the tunnel dryers, such as I have described, is another important factor. The drying by steam of the green brick fresh from the machine gives solidity to the brick, and, as I have stated before, the heat should be so uniform as to gradually absorb the water smoke so as to get thoroughly saturated with the damp heat. The further the cars are put into the tunnel the better, for they can then get the hot dry heat, and thus render the possibility of cracking to a minimum—in fact no cracking observable.

The day is not far distant when the brick manufacturer will see that it is to his interest, both financially and from a professional standpoint, to have his brick thoroughly dried, and by the latest improved methods, before setting in the kiln.

Experience, which, in most cases, has been costly, has demonstrated that to make a perfect brick is to have a perfect dryer. We can not always depend upon nature, and in many instances "Old Sol" has kept in hiding when his presence was most needed by the brick

man, who wanted his brick dried.

The natural deduction to be arrived at from observation, research and large expenditures of time and money by a brick manufacturer is to instill into the minds of all the absolute and infallible necessity of artificial drying. It matters not so much the method used, as the fact of its practical and economical value. It is not economy to save expense in drying and lose your brick. It is a false notion, and the quicker the remedy is applied the more advantageous it will be to the manufacturer. Proper drying is the fundamental point of good brick, and this once accomplished, no trouble will be experienced from the remaining features of the preparation of the brick for the kiln.

I thank you, Mr. President, and gentlemen of the Association, for the courtesy you have shown me in giving my paper such close attention, and trust that what I have stated may inculcate into the minds of the skeptical the fact that, to make perfect brick you must have perfect dryers, and that can only be obtained by artificial means, such as I have endeavored to show.

DOWN DRAFT DRYING OF CLAY WARE.

BEFORE speaking especially with regard to Down Draft Drying I will ask permission to speak of the general subject of drying clay ware.

One would hardly think it necessary to say anything to clayworkers on this point, yet but recently a tilemaker in trying to run down his neighbor's product said, "he thought his tile were too dry when put into the kiln," so we see that the question of the thoroughness of drying is not entirely appreciated.

In another instance, when a manufacturer was asked concerning his success, said: "We are getting along splendidly. We set our tile quite green but burn slowly and have good results." Yet soon after this he complained that he could not see why his large tile cracked so badly.

Do not deceive yourself young clayworker. You can not afford to set green ware in your kilns.

A large per cent. of clay goods are dried by artificial means. When we set our product in the open sheds or out in the sun to dry, the process goes on quite

naturally, and we need not ask why or how the drying takes place, but when we do not wish to depend upon natural heat and natural currents of air to carry off the fifty or one hundred barrels of water that is in our ware as it sets to dry in our building, and can not copy after some other successful plant, we then *must* ask under what conditions clay will dry most successfully.

You will pardon a little personal experience.

Several years ago, when contemplating the erection of works in which we would not be dependent upon summer heat to do our drying, in search of information, of course we came to a meeting of the Ohio Tile, Brick and Drainage Association, and as nothing seemed to touch our case, we ventured to frame an inquiry for the Question Box, which we thought would turn a flood of light our way; but when the question was read, silence reigned; but finally one veteran ventured the opinion that steam though confined in pipes was too damp to dry with.

I believe it has been but a few years since a Columbus tile manufacturer received a patent upon a plan for getting rid of the moisture from his drying room by passing it through a hot kiln of tile and burning it up.

How frequently do we see the attempt made to dry tile or brick by placing them in an almost entirely tight room, under the floor of which are placed steam pipes. The result, on account of lack of ventilation, is that we have a steaming box rather than a drying room, and the ware does not dry although the room may be quite hot.

In order that anything should dry it is simply necessary that warm or heated, and consequently expanded, air should be brought in contact with it when the moisture will pass from the product until the air becomes saturated; then this air which is loaded with moisture must be removed and a fresh supply of dry air, as we call it, take its place and this is repeated until the ware becomes dry.

There is a degree of moisture however, which clay will not relinquish by drying, but must be burned out and passes off in what we call water smoke. When this last degree of water has passed off, the clay has lost its plasticity, that is if re-ground it would not stick together.

In applying the term down draft to drying, we mean by it precisely what is

*Paper read by W. C. Denison, of Delaware, O., before the Ohio Tile, Brick and Drainage Association.

meant by it when applied to burning. Hence it is hardly necessary to describe in detail its application. We are all familiar with the advantages of down draft burning and we believe there are even greater advantages to be derived from this principal when applied to drying.

The construction of buildings for using this method of drying with artificial heat may be considerably varied. One essential being, that the room in which the ware is placed to dry should be tight as possible at the top with no ventilation above the ware, but provided with slat floor and ventilation below. Another essential being that, in order that exhaust fans or ventilating stacks be unnecessary, the drying room should be placed at a higher elevation than the source of heat. Heat is then admitted into the room above the ware from furnace, steam pipes or cooling kilns as may be desired. The result is that, as the heat flows in above it continually crowds the cooler strata of air, which are saturated with moisture, down and out through the slat floor.

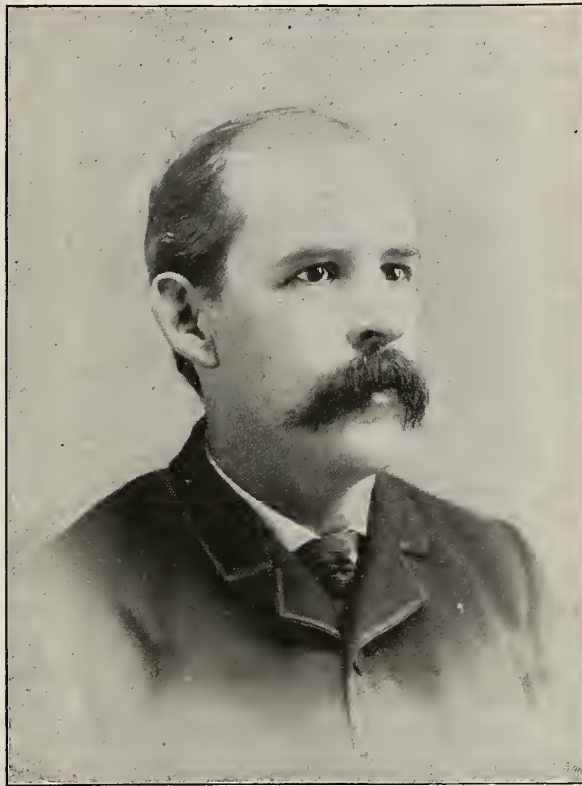
Some of the advantages that may be mentioned are first the ware all over the room dries alike. The heat naturally distributing itself evenly over the entire room and descending gently as it is forced down by the heat flowing in above, there being no perceptible currents, the most tender ware is dried safely and rapidly. It is especially adapted to drying large tile and pipe as the upper end is dry before the lower end scarcely begins to dry, so they can be turned safely before they begin to dry and shrink on the floor which causes checking. Allow me to say that we do not turn our 15 inch two foot length pipe until they are sufficiently dry, so that one man turns them quite readily by hand, and there is no checking or cracking. The dropping of condensation from the roof in cold weather is also avoided.

Instead of the moisture arising and coming in contact with the cold roof it descends from the ware and passes off.

It is an economical method since no fans or stacks are necessary to produce ventilation, and the heated air does not escape until it has done its work, while in the ordinary system with ventilators in the roof certainly a large portion of the heat passes up and out without

carrying its full load of moisture. Also as in up draft burning the upward currents are not equally distributed, but are most intense over the greatest heat or through open spaces, or in places where the least ware is set so that it not only dries or burns too rapidly in these places, but, as before mentioned, the heat passes off without doing its full work. The objection may be urged that we wish neither to erect high buildings nor to elevate our ware to upper floors.

As to the first, one story buildings are certainly not the most economical to build, and as to the second, if we consider the little actual cost of elevating



F. W. BENNETT, PRES. WELLINGTON (O.) MACHINE CO.

ware to second or third stories compared with the advantages that cost it will be insignificant. The escaping heat from cooling kilns is quite readily utilized in this method of drying; it being necessary only to place a roof or hood over the kiln, and connecting this with the drying room or rooms, the quantity of heat being abundantly sufficient the drying goes on night and day, Sunday and week day with slight attention and no expense.

Mirth is the medicine of life;
It cures its ills, it calms its strife;
It softly smooths the brow of care,
And writes a thousand graces there.

—ANON.

Written for the Clay-Worker.

BRICK SIDEWALKS.

THE pride and ambition of every good citizen centers on the possession of a home of his own. He usually calculates on its location in his native village, or he may aspire to a more pretentious city home. His ideal place must be one possessing certain advantages and conveniences, which tend to comfort, healthfulness and attractiveness.

Prominent among these is the matter of streets and sidewalks.

With the general waking up, the stir and activity of town building, and the demand for and improvement of the public streets and thoroughfares of the villages and incorporated towns, came a wide and growing demand for a good cheap paving material for sidewalks.

We can all recall how this is usually supplied in the smaller villages with plank walks, put down in various styles, and serviceable for one season. After one year's use and exposure to the elements, they are warped, split, showing rot in places, or there are numerous broken planks, which endanger life or limb; and are from thence on an eyesore or a continual bill of repairs.

All things considered, bricks for sidewalks are cheaper and more desirable than any other material, for the man who must count the cents before he spends the dollars, and cost is usually the first consideration in the matter of home building.

There are other kinds of sidewalk that are more attractive, easier kept clean, are smoother, or drier; but the item of cost is of paramount importance to the average home maker.

In our larger cities, on business streets it is fitting and proper that property owners put down heavy stone walks, or pavements of cement or granolithic concrete or manufactured stone. But suburban residences do not need such expensive sidewalk material. Usually the masses are well content with a sidewalk of bricks if it is properly constructed.

Right there is the point we would emphasize. "The proper construction of brick sidewalks." An inspection would reveal the fact that in three-fourths of all brick sidewalks put down, the work is illy done. This is why the "Tar and

Sand" men are driving their humbug article over us in their attempt to supplant the old standard sidewalk, and we can see now in the suburbs, great stretches of these walks put down as an inducement to would-be purchasers of town lots.

In my daily walks around the towns, both at home and abroad I have studied the sidewalks first, the people afterwards. I find they all do about as their neighbors. If A puts down a board walk, B does likewise. If C lays a brick walk, and does the work himself, D will make the attempt, or set his boys at the job. The work is performed without any attempt at skill or perfection of detail. In these days of light and knowledge, the average citizen thinks he need not be told how to put down brick sidewalk. He will tell you he has seen it done hundreds of times and it is a very simple affair. So he has, usually by some one as ignorant of the matter as he himself.

In the South there are a great many colored men who call themselves bricklayers. They generally secure all the jobs of laying brick sidewalks or repairing same, at an advance of twenty-five cents per day above laborers wages. These men without having learned a trade, with little skill or practical knowledge of mechanical work, are entrusted with work that requires care and judgement to insure a good and lasting job.

We frequently find the brick walk full of sunken holes, crushed or rotten bricks, the whole walk is wet, sodden, muddy, and one is inclined to avoid going over it. The bricks are lying in a pool of clay and water, that when stepped on roll around and sink deeper in the mud, or send a shower of muddy water upwards waist high over the person. The writer has had the water squirted in his face on several occasions from beneath the bricks of such walks. The trouble was, there was no drainage for surface water. The bricks were laid on the clay which is no foundation. Every wet spell or heavy shower drove them down deeper, and made bad matters worse. This caused the owner and all others who walked over it to condemn brick sidewalks. The fault was not in the bricks, it was in the construction of the walk.

The brick that will wear out, disintegrate under the heels of pedestrians or by the elements of frost and water, should never be put in the sidewalk.

The one bad brick in the midst of the hundred good ones condemns the whole lot.

In many places, towns and villages are built on hilly or rolling ground. The grading of streets leaves many of the town lots from one foot to five or more feet above the grade. The surface water from these lots falls down and is scattered over the sidewalks and is a source of much annoyance, unless precautions are taken to carry this water away or under the sidewalk.

We will suppose your street is brought to proper grade, and curbed. Measure back from the curbing the width of the walk adding six inches, remove the earth, soil or clay eight inches below the top of curb line and make the bottom level and solid.

The excavation should now be filled in with five inches of fine crushed rock, coarse gravel, cinders or coal ashes, or any other good hard material that will answer the purpose of drainage. This should be leveled and made solid; on top of this put two inches of sand, spread evenly about the concrete and give it one and a half inches of fall to the curbstone, bringing it to the grade with a templet. The bricks, which should be good and hard, well burned, are now laid on the sand foundation, but down to a line, or straight-edge frequently applied. As fast as the bricks are put in place, scatter clean sharp sand over them, and with an old broom sweep it well into the spaces between bricks, which should be as small as possible. Leave a good coat of sand on the walk until the bricks are firmly bedded, then sweep clean. A row of bricks on end or on edge on the outside of the walk, next to the fence or wall acts as a protection to the walk and assists in keeping surface water from flowing over it. BRIX.

WHY HE DID IT.

A prominent and very successful manufacturer was recently asked why he did all of his advertising through the leading trade journals and never sent circulars, or put up posters, replied: "Men who do not read their trade papers and keep posted in their business are usually poor customers. If I sell them a good lot of machinery, they do not know how to use it and report it a failure, or, we have to run after them, lose time and money, to get them a going and make the sale stick. But those who read and are posted know how and succeed. Such

men would not read circulars if I were to mail circulars to them. They see my ad., regularly, in the trade paper, and know that I have an established business, and when they want anything in my line, write me, and don't whine about price, or what time he can get from others, but buys, tries and has no trouble, and pays the bill. Give me such a class of customers as I get by such judicious advertising all the time."

—*Drainage Journal.*

Written for the Clay-Worker.

BRICK AND WOOD CONSTRUCTION.

WE find, to-day, very few buildings which are constructed both in brick and wood. Nearly all that we see remains from the fifteenth and sixteenth centuries. In many places on the continent we see isolated examples of this construction, buildings which have survived the vicissitudes of the centuries and still hold their own against the modern spirit of change and enlargement. But a whole town built in this brick and wood construction is rare. I recall but three. Two of these lay on the northern edge of the Hartz Mountains. They are a little out of the usual line of travel, have not been greatly disturbed by war or revolution, and to-day present practically the same features as when they were first built. One finds himself in a town of three or four hundred years ago—a strange experience.

A walk through these towns is a dream. Each street seems more extraordinary than the other, each house more remarkable than the preceding. Yet with all the variety, nothing is out of harmony. The whole forms a complete picture which satisfies one's sense of the picturesque. Most of the houses are built with each story projecting one over the one below. When they reach five or six stories in height it is almost possible to shake hands across the street from the top stories. The houses almost seem to be saluting each other, so much do they incline across the street. The effect is beautiful, even if one does recognize the fact that they often exclude the sunshine from the streets, and thus effect the health of the children playing below.

One of the most striking features of these houses is the superabundance of small windows all opening outward. When the setting sun strikes them on a lazy summer afternoon and reflects the light up the street, one imagines himself in a fairyland of shimmer and gold.

These old builders of the 14th and 15th centuries had their eyes and sense tuned to the picturesque. In their work

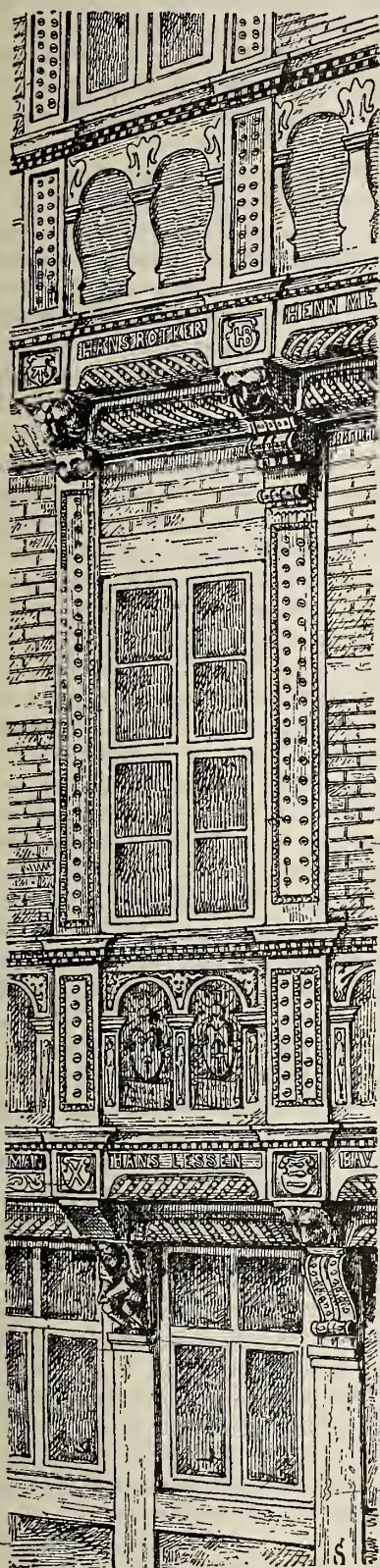


FIG. 1.

there is ruggedness of outline, boldness of construction and richness and beauty of detail. They knew how to avoid the

monotony of modern city building. There is no commonness or repetition in their work. The richness of coloring, strangeness and beauty of the decorative parts should be a lesson to those interested in building matters. Figure 1 is a section of a building from Halberstadt. The structural and decorative parts are of wood, and the filling is of brick. The ornamentation is almost entirely in the carved wood, which is richly colored. The profuseness of this carving does not give the buildings the appearance of being overloaded with ornament. While

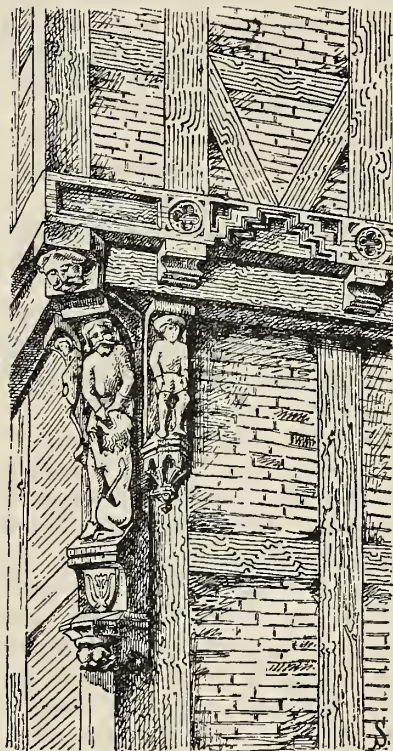


FIG. 2.

the woodwork is rich and profuse in its decoration, it has the contrasting plain surfaces in brick which give repose to the structure. Then again, the ornament appears to be where it belongs and thus is freed from the disturbing influence of that which is thoughtlessly applied, simply for the sake of decoration, and without regard to the fitness of architectural construction. On the lower story one sees the upright posts with the window sash apparently framed in by them. The ends of these posts are carved, as are the beams which rest on top of them. The horizontal outside beams are chamfered and decorated between the upright supports. Above this work is the panelled decoration. This same motive is repeated, story after story, as the building in-

creases in height. There is only the variation in detail to make the distinction between one story and another. The panelling and carving are picked out in color which is quite brilliant but always harmonious. Some one has said that these old German towns are as full of color as a picture book. Each building appears to be vieing with the other in interest and brilliancy.

Figures 2 and 3 are details giving a clearer idea of the decorative work and its union with the brick. When one remembers the age of these structures, it emphasizes the value of the construction. These men took the materials at hand, built simply and in good taste. As a result, after four hundred years, their work is still alive and stands an example of good construction and artistic conception.

These old German builders were fond of inscriptions on their buildings. Figure 1 shows one way in which this was done. The inscriptions are various in motive. Some tell the story of the man who built the house; others have texts from the scriptures; still others, rare bits of philosophy and wisdom; again a bit from the classics. I remember several which said, in one way or another, that the art of the builder was without avail unless God "keepeth the house." These old German burghers were pious people.

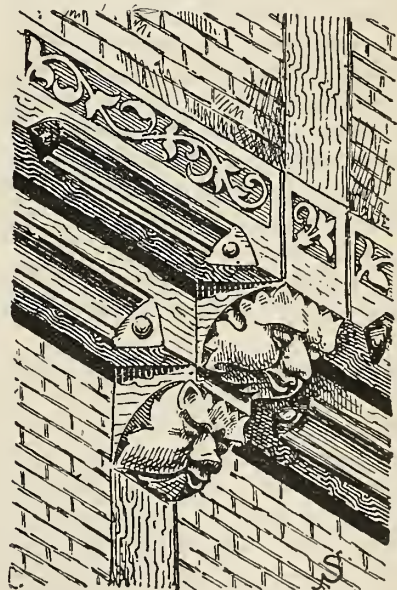


FIG. 3.

One great lesson to be derived from the architecture of these towns is, that the way to a national or sectional architecture, which is successful constructively as well as artistically, is to take

the material at hand and build "according to local traditions." In other words: follow the needs of the people in construction, build rationally, and decorate with an artist's sense and there develops a rational architecture which has a national characteristic. L. H. GIBSON.

Written for the Clay-Worker.

CHEMISTRY FOR CLAYWORKERS.

Paper No. 1.

TO prevent any misconception as to the scope of this series of papers I may just say that the Chemistry for Clayworkers is the chemistry for ironworkers and woodworkers too; just the same as geometry is the same and equally as valuable to the tin-smith, carpenter, bricklayer, draftsman and engineer, they all use it in their trade or calling, but many are unaware of it, and would question its utility in their own case, if they were requested to study it up a little. Now the same objection will—I have no doubt—be raised by some of the clayworkers to studying up a little chemistry. They fail to see the necessity of a brickyard hand or a potter qualifying for a drying store, and I might be requested to point out the successful clayworkers in any branch who are chemists or who pretend in the least to know anything of the subject; here I must confess that there are hundreds of successful brick, tile, sewer-pipe and pottery manufacturers who never read ten lines of a work on chemistry in their lives, some probably who can scarcely read at all, because they were yoked to the drudgery of a brickyard when very young, and thus deprived of the advantages of a little schooling; this, however, is not a very telling reason why chemistry should not be read up more than it now is.

We do not claim everything for chemistry. It does not teach the bricklayer how to build a wall plumb, nor to build one wall at right angles to another; neither would it afford any information to a clerk on single and double entry; nor to the brick manufacturer as to how he should govern his men and at what price he shall sell his bricks, etc. These are indispensable elements in the make up of the successful brick manufacturer, book-keeper and bricklayer, but they do not come within the province of chemistry.

It would be a very difficult matter to show how chemistry would lighten the

labor of the "digger," the "tosser," or the hand molder, and consequently, it is no easy matter to convince them of any benefit they would derive from such a study. Young men who have no ambition beyond digging, tossing and molding clay, and possibly dabbled in bar-room politics, will need a "change of heart" before these letters will in the least interest them, but young men of reading habit and enquiring turn of mind may from these letters be induced to read and study up the standard authors on the subject, and if they derive as much pleasure from such a course as I do, apart from any financial advantage they may derive, they will find they have "struck" a mine of intellectual wealth, not to be valued by dollars and cents.

I have stated very briefly what chemistry will not do and what we may not expect from it. Let us now see what it is, what it has done, and what it will do.

Chemistry then, is the science which treats of substances both elementary and compound, with the properties and laws that govern them.

"The earth is made up of a variety of solid liquid and gaseous materials. Chemistry investigates the relationship between the different kinds of atoms or particles of which these materials are composed. If the earth were composed of only one simple substance, there could be no such science as chemistry.

All substances, whether animal, vegetable, or mineral, are either *simple* or *compound*. Those which cannot be reduced into any simpler form are called *elements*, and these elements combine to form an infinite variety of *compound* bodies. We may illustrate this by the letters of the alphabet, which cannot be separated into any simpler form, but by different combinations form a great variety of *words*. These words can be separated into their letters as can compound bodies into the elements of which they are composed. It is only compound bodies which can be thus separated. *Sulphur, iron, zinc, copper, oxygen, hydrogen*, cannot be resolved into any simpler substance; they are therefore called *elementary* bodies. Water can be separated into oxygen and hydrogen, and is therefore a *compound* body, and not an element, as was once supposed. Again, chalk, (limestone and marble) or carbonate of calcium, is made up of three elementary bodies—a metal called calcium, oxygen and

carbon. Common salt is composed of two elementary bodies—a metal called sodium and chlorine. * * * *

The separation of these compound bodies into simpler forms is called *analysis*, and the formation of compound bodies by the union of simple ones is called *synthesis*."—Buckmaster's Chemistry.

There are about seventy so-called *elementary* bodies that have up to the present, resisted all attempts at further reduction, and until they are further reduced we must agree to call them *elements*. They are generally divided into two classes, *metallic* and *non-metallic* bodies. This classification is for convenience only.

The metals are lustrous and conduct both heat and electricity, with varying degrees of facility, while the non-metallic bodies are generally devoid of these properties; this appears to be the leading distinction whereby these two classes of bodies may be known.

All the elementary bodies are represented by symbols; some of them by the initials of their names, others with the addition of another letter besides the initial. Some of the elements retain their Latin name as well as the English one. The six elementary bodies mentioned above are thus represented: Sulphur, S; iron, Fe; zinc, Zn; copper, Cu; oxygen, O; hydrogen, H. In these six elements, incidentally mentioned, there are two which still retain their Latin names; viz., *ferrum*, (iron) *cuprum* (copper). The chemist does not speak of them as ferrum and cuprum, he calls them iron and copper, but their symbols remain, and are always used in Latin.

The symbols must be committed to memory for they are of great importance in expressing chemical changes; they are the shorthand of chemistry and simplify its reading very much, for they indicate vastly more than the mere name of the element, which will be shown a little further on.

The drudgery portion of reading up chemistry is, the committing to memory the names of the elements, their symbols and atomic weights, specific gravities, etc., but I do not think it more difficult or tiresome than the study of music or English grammar, the elements of which must be mastered to attain proficiency, and the same applies to any branch of science.

None of the readers of this journal need lecturing on the folly of rearing

high and heavy structures on flimsy foundations, nor of the necessity of excavations to get a suitable bed on which to lay a foundation; just the same with science structures, *excavate* until you have removed all *prejudice*, then lay a good solid base of first principles, then erect your structure with all the skill and patience you can command. If you come in contact with obstacles make up your mind that they are surmountable and a little study will remove them, do not for a moment imagine you have run across some error or contradiction. I know a young man who wastes a great of his time trying to trip up science and belittle it, and is delighted when he *thinks* he has a case of nature going back on herself, but my friend "Harry," always comes out second best.

Do not stumble over hard and apparently incomprehensible words, such as you do not meet with only in treatises on chemistry, etc., etc., such words as, Allotropic, Amorphous, Isomorphous, Molecule, Quantivalence, etc. I remember well how such words used to baffle and perplex me, and their meanings too sometimes, even when very plain language was used to describe them. If you fail to comprehend chemical terms and phrases at first reading, do not pass over them with the inward remark, "Oh! hang them they are not worth bothering with," and so pass on to something more easy and interesting; no, stay with them awhile and if you are not successful, leave them a while, but go back to them and master them.

Some of the elements are known by more than one name; *mercury*, is also called quicksilver, and *sulphur* is known also as brimstone. *Carbon* is known as coke, charcoal, anthracite coal, soot, lamp-black and bone-black. Many of the compound bodies too, have popular names, which were given to them in the early days of chemistry, and they are still retained in common use. For example, muriatic acid, oil of vitriol, aquafortis, spirits of hartshorn, etc. The chemical names of which are, hydrochloric acid, sulphuric acid, nitric acid and ammonia. There are many more, but we need not name them just now, they will be mentioned in their proper places.

There are thirteen non-metallic bodies. The balance are metallic. Of the thirteen non-metallic elements, four are gaseous at ordinary temperature and pressure, and one is liquid, and one has not yet been isolated. The following

table shows at one view the names of these elements, their symbols, atomic weights, and their general condition or state whether solid, liquid or gaseous:

Name,	Symbol.	Atomic Weight,	State,
Hydrogen	H.	1	Gas.
Oxygen	O.	16	"
Nitrogen	N.	14	"
Chlorine	Cl.	35.5	"
Bromine	Br.	80	Liquid.
Iodine	I.	127	Solid.
Fluorine	F.	19	?
Sulphur	S.	32	Solid.
Selenium	Se.	79.5	"
Carbon	C.	12	"
Silicon	Se	28	"
Boron	B.	11	"
Phosphorus	P.	31	"

The element tellurium is classed by some chemists as non-metallic. It is a very rare substance, and it is of little or no consequence just now to which class it is assigned, it will be referred to again further on.

You will observe in the table a new feature which has not yet been explained, viz., *atomic weights*; this must also stand over until my next letter.

The above table is a specimen of what is called *chemical notation*, which means, *chemistry noted by signs, symbols, figures or characters*. You will easily perceive the necessity of using two letters for some of the elements, it is because the initials alone would lead to confusion, there being several names with the same initials. There are nine of the elements that have C for their initials, therefore all except carbon, have some other letter in their names added to the initial.

I think this is sufficient for one letter, and to those readers who wish to follow up this subject and profit by it, I would say, commit to memory the above table in its entirety so as to be able to answer any question at once, relating to the symbol, atomic weight, and state of any of the thirteen; remember also what has been said about the popular names of some of the elements and compounds.

I shall have something to say about compound bodies in my next. Compound, in chemistry, means a little more than it does in ordinary language. Copy in a memorandum book, or on a sheet of note paper, all the substances mentioned above, and the symbols of all that have been given, etc. Carry this memo. in your pocket and take a glance at it when you have an opportunity, and the CLAY-WORKER is not at hand; this once copying will assist you greatly,

much more than you are aware of unless you have experienced it before.

To conclude this letter I will give you just one short paragraph from Baron Justus Von Liebig, a name you are no doubt somewhat familiar with, if only seeing the advertisement of "Liebig's Extract of Meat."

Liebig was a very clever chemist, a most profound thinker, and a very pleasing writer. Take the following as a sample:

"As the human mind advances in knowledge, from whatever source that knowledge may be derived, all its powers are strengthened and elevated; and its progress in all other directions thus promoted. The exact knowledge of the relation connecting certain phenomena, the acquisition of a new truth is equivalent to a new sense, enabling us now to perceive and recognize unnumberable phenomena, which remain invisible or concealed to others as they formerly were to ourselves."

WM. WAPLINGTON.

Written for the Clay-Worker.

THE GROWING IMPORTANCE OF BRICKMAKING---ADVENTURERS AND AMATEURS IN THE BUSINESS.

BY J. W. CRARY, SR.

THE remarkable progress in brick-making and the quiet phenomenal demand for brick within the last dozen or fifteen years has made the industry one of general concern. It has jumped from a slow, old plodding art and business to a line of thought action and energy, not dreamed of forty years ago, but like all progressive things, it has its drawbacks. Capital, adventure and push have outrun the supply of skilled, practical men in the art, and many brickmaking plants are in need of better skill than they have or can command.

NEW FIRMS IN BRICKMAKING OFTEN START
WRONG.

The common error of these who start plants for brickmaking, is, that they overlook the fact that skill and knowledge in the business is of far more importance than money. They get the clay bed, the machinery and what they suppose to be an expert to erect a plant, and then figure out a fortune by calculating the capacity of the machinery. That is taken as the true unit of profit. It is thought to be the primary instead of the secondary consideration, as it should be.

CLAY, LOCATION, SKILL, LABOR AND MARKET

Should be the first things to consider. After these points are settled, it is an easy matter to determine the question of machinery.

If the clay bed is homogenous, comparatively dry and of a good quality some one of the many dry press machines would be best, especially if in a cold climate. If the clay be differential and stratified, and damp or wet, then a dry press machine is not suitable. The cost of drying, pulverizing and mixing the clay would be too much. If the clay be very plastic, a semi-dry press or stiff mud machine is best, but if the clay be weak and friable, a soft mud machine is best. Whatever the machine may be, complete pulverizing and mixing of the clay is of first importance.

PLANNING AND ENGINEERING A PLANT FOR BRICKMAKING REQUIRES PRACTICAL SKILL AND BUSINESS JUDGEMENT.

It should be so planned that every movement should be made from the clay bed to the kilns, or place of shipment, and, if practicable, on a grade inclining toward the point of shipment. If it is contemplated to enlarge the plant, it should be so planned that no work first done will have to be attested or changed, and all temporary work and experimental machinery should be avoided. *Tentative* brick works have been the downfall of many green brickmakers.

A THOROUGHLY SKILLED MANAGER OF THE FIRST IMPORTANCE.

I have said in previous writing that it requires a peculiar sort of men to be good brickmakers, and it is generally peculiar sort of men that start out without any experimental knowledge of brickmaking to make a fortune quick at the business.

The peculiarity I speak of, consists in some ready cash and a big stock of self conceit, and self opinionated importance. This kind of human nature has no proper estimate of modest merit, or virtue. It recognizes few equals, and no superiors, and favors only those who will feign to agree and think with them, and with truculent subserviency sound their praise and do their bidding. These self deluded men will take a notion to make brick; they have found, or perhaps own, what they believe to be a good mine of clay for brick. They send a specimen of their clay to a brick machine man. Of course, the average brick machine man will manipulate the

clay so as to make a fairly good looking brick, for he sees the sale of his brick machinery in the success of this experimental brick. The brick is returned, or rather the specimen clay is returned a brick, and the owner of the clay bed thinks that the clay matter part of his purpose to make brick is settled.

Now for the brick machine, of course, the brick machine that made his *trial* brick, is the right machine for his clay, and the brick machine man has sized up his customer and knows exactly what to do to sell machinery to him.

In due time a machine is ordered. Meanwhile our new brickmaker lays his plans for a brick plant and looks around to get suitable experts to carry out his plans, perhaps he advertises for experts, and possibly a good reliable man may apply for the position. But if he be a good reliable man, when he goes to see the place and the proprietor, he will see that the plans and notions of the owner is at fault, and will properly point out the chief difficulties in the way. He very properly and modestly points out that the clay will not do for the machine that he has ordered, and that the kilns, driers, etc., are not of the best kind for the place, and that the whole plan for the plant might be improved, but the self-sufficiency of our new brick manufacturer did not advertise for plain good advice, he has been posted by his brick machine man, and by others who have some selfish purpose, and know how to manipulate their man, so he informs the honest expert, who applied for a position as per advertisement, that his services are not desired.

Now the man who says that he can do all that our new brickmaker wants done, and that congratulates him on the wisdom and perfecting of his plans, and his admirable choice of means to carry them out is at once employed at a big salary, to take charge of the proposed enterprise. In due time a brick machine comes, and an expert soon appears to put it up and in operation, he is perhaps a trained expert in making and burning brick with the machine he puts up, and makes and burns one small kiln, it turns out very well, and the machine is then paid for, and a certificate is given of the efficiency of the machine. (This is only done by a few of the machine men, most of them sell their machines on their merits or name and get the pay in advance.) Now, our new brickmaker has, as he

believes, made a success fairly good in his first effort, and he is quite sure that with his accomplished, agreeable self-sufficient expert manager he will continue to succeed. A new and large kiln is soon made and burned, but it turns out badly. The expert brick maker in charge, fertile in excuses, has a ready reason for his failure. He essays to make another kiln, and the same result follows as at first. A new expert manager is called and he pronounces the failure both in the machine and his predecessor. A new machine is ordered, and the old one is advertised for sale. The new engine is more successful, but many improvements are to be made and as the concern is doing pretty well with one machine, two machines, of course, will double the output, and the profit, so another machine is ordered, then it is found that there is scarcely room for it and that the planning of the "*plant*" was improvident and unskillful, so unsuitable and expensive provision must be made for increased operations, and by the time this plant is in successful operation, enough has been spent in needless and wasteful management to have put in successful and efficient operation the best kind of brickmaking works.

All this comes from the fact that there is a great and very remarkable deficiency in regularly skilled, well qualified, professional brickmakers. If this want of professional men were well supplied, amateur brickmakers, like men in most other lines of business, could readily command reliable skill in starting a brick plant.

WHAT ARE THE NECESSARY QUALIFICATIONS OF A THOROUGH BRICKMAKER?

I have pretty well answered this question in my book on "Brickmaking and Burning," but to be more specific, I will say that a man must first have an aptitude for the business, then he must not only have a desire to study and learn it but he must determine to master it in all its details, and various departments and circumstances. He must be fairly versed in mathematics, physics, drawing, mechanics and to a certain extent in chemistry, then he must have a thorough practical knowledge of all kinds of clay and of burning them; he must know the machinery and kilns best adapted to the kind of clay he is called to deal with, and be able to consider and correctly decide as to the best way and

plan of procedure under the particular conditions and circumstances. Any man who starts a brickmaking plant without these qualifications is at sea without "chart or compass."

THE BEST THING FOR PATENT BRICK MACHINE MEN AND KILN MEN TO DO.

Every one of them that has a real good machine or kiln to put on the market—should first provide themselves with the sure and reliable services of a first-class expert in brickmaking and burning. Then, in their advertisement, propose to send their expert to the place where their machine or kiln is to be used, to examine and report the main facts of the case. If the machine or kiln be suitable for the place then propose to put up and operate one or both a certain time, say until three kilns shall be made and burned, and fully guarantee the success of their inventions with proper management. The owners of a brick plant under the above conditions could be assured of success with proper management, and having seen just what that must be, they would be willing to pay the price of an expert manager, instead of getting a mere *pretender* or *blockhead* to run machinery and kilns under the self-conceited supercilious boss, who, knowing really nothing, "knows it all."

The brick machine and kiln men now content themselves with testing a specimen of clay sent to them, (it may be or not be genuine), or with offering to guarantee success when it is apparent that the only reliable guarantee is practical demonstration.

When the makers and consumers of brick come to understand the importance of good brick and building, intelligent experts will follow brickmaking and burning as a profession, and will be paid and appreciated accordingly.

VITRIFICATION.

WITH some there is a doubt as to what constitutes a vitrified brick or tile, and those whose duty it is to inspect pavements are not always fully informed on this point. Streets are frequently paved with brick that are not vitrified to the extent that the best wear requires—often, indeed, thousands of the brick laid are not vitrified at all. But those whose duty it is, to examine and report upon the work, report favorably, when in fact the brick are not vitrified, as the contract required.

It is charitable to suppose that those receiving such work are not corrupt, but misinformed, since there are so many who are not informed upon this subject. Because a man can talk fluently as to the benefits of brick paved streets—how the work should be done—it does not follow for a certainty that he knows a vitrified brick when he sees it. Not long ago, a brick was handed to us to commend as a sample of those being laid in a street. On examination we found the brick to have a heavy glaze on the outside and only fairly well baked on the inside. The brick was fragmentary, lacking the solidity and compactness necessary to make a good paver. A blow on the broad side of the brick with a hammer would break it into many pieces with ease. Those interested in the street that was being paved were fully satisfied as to the character of the brick being laid, forsooth because they did not know a well vitrified brick when they saw it. Neither did the town council. Brick pavements are new, comparatively, to most people, and it is not to be expected that they should know, what is the best material or best method of constructing pavements. And we do not exempt all civil engineers from the list of those who do not know a vitrified brick when they see it, or the best method of construction. Besides, we have found some of the latter very stupid and stubborn in their ideas of material and methods of construction.

A vitrified brick is one that has been subjected to a degree of heat sufficient to cause the alkalies and other fusible ingredients in the clay to fuse and unite the particles together. The vitrification may be only in part. If the brick when molded is not dense—closely compacted, and the vitrification not sufficient to fuse the entire mass into a solid body, though the vitrification may have been sufficient to unite the particles at the point where they touch each other, but the porosity of the brick is such as to make it unfit for paving purposes. The brick may be sufficiently vitrified if the density had been greater.

A brick should be made to contain as much clay as possible in a given space, the size of the brick desired, brought up to a degree of heat sufficient to fuse the fusible ingredients in the clay uniting the body of the brick together with a glassy substance. Such a vitrified brick is suitable for a paver, if otherwise acceptable. It does not follow, however,

that a brick made dense, and vitrified, is necessarily a good paver. The composition of the clay and fusible elements may be such as to constitute a brittle brick when vitrified.

However, if the brick retains its form perfectly, and is dense and well vitrified it proves to be a good paver, with few exceptions.

That some clays are better adapted to making pavers than other clays needs no proof, but it is also true that clays may be prepared by tempering and thorough mixing and careful handling throughout, and burned so as to make good pavers, or good ware of any kind, that would prove a woeful failure, if carelessly handled throughout.

Again, there are clays, which, if brought up to a degree of heat sufficient to vitrify, run together into one common mass, which may occur in an overheated spot, but the clay is so fusible that it is hardly possible to do otherwise than melt the kiln down, if the vitrification of the brick or tile is attempted.

It is not infrequently the case that some purchasers of tile demand hard tile, believing that there is danger of the tile being injured by frost in the ground, if only burned to ordinary hardness, of which there is not the least danger, but the demand for hard tile or tile partially vitrified is made, and the tilemaker makes the attempt to supply the demand, to his sorrow.

Brick or tile may be vitrified if the clay will retain its form while the degree of heat is being attained, sufficient to fuse a portion of the ingredients, and thus unite the body of the clay.

We often hear men speak of "semi-vitrification," which may mean half vitrified or slightly vitrified, and we are inclined to the opinion that the word used to designate the kind of pavers to be used in a contract usually has the latter implied meaning.

"Semi-vitrified" fails to describe the degree of hardness, denseness, or flexibility, necessary for a good paver.

There are clays that may be brought to a sufficient degree of heat to take a salt glaze—a heavy glaze—and not vitrify inside, slightly. In fact they may not burn to a degree of hardness sufficient to make them desirable for building brick, and the body of the brick may be dense enough when it comes from the press or kiln to present a good appearance when broken. The brick are not sufficiently burned to vitrify the body though presenting a glassy hard-

ness on the outside on account of the glaze. The manufacturer may conclude that it is cheaper to glaze on the outside than to vitrify the body of the brick. We have seen such brick. Tile manufacturers may have clays that require a high degree of heat to bake or burn the tile sufficiently, and the degree of heat may be so high that they can better afford to add a salt glaze when the heat is sufficient, than to continue to increase and hold the heat long enough to make the tile hard or slightly vitrify them.

TIMELY ADVICE.

A recent writer on "The Manufacture of Brick by the Dry Clay System," in speaking of the proper machinery to be used, says:

"In selecting a brick press care should be had that it is as simple as possible in its mechanism, and that the material used in its construction is of the best quality. Owing to the enormous strain to which machines of this class are exposed, a large amount of money is annually lost in choosing badly constructed ones, because of the poor quality of iron or steel used in the castings or other parts, thereby causing breakages to occur which would not otherwise take place. It of course becomes apparent that in matters of this character the purchaser has to rely largely upon the reputation of the makers of the machines, and this is a subject that should receive attention at the time the contract of purchase is made. An inferior machine, or a machine constructed by inexperienced men, and sold only for the profit that is to be made from converting cheap pig-iron into the shape of dry clay brick machines, would be costly at any price,—even as a gift."

This is indeed timely advice, and good solid sense as well. None of our readers can do better than to follow out these suggestions in selecting their dry clay machinery. We have before called attention in these columns to the danger of using poorly constructed machinery, and the advisability of each brickmaker investigating for himself before contracting for his machinery. We know that poor machinery means certain financial ruin to any brickmaker in the country. Doubtless each one of our readers can recall a case or two that will serve to illustrate this point.

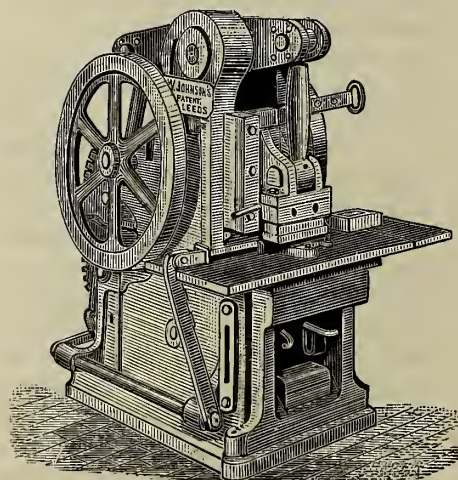
Power, strength, simplicity and suitable adjusting arrangements are the essentials of any machine that is de-

signed to make brick by the dry clay method. The frame-work of the machine should be solid, so that it cannot be made to vibrate by the working parts. Simplicity of construction and operation, coupled with strength, will insure durability; and such a machine, properly handled on good clay, will insure financial success to any brick-maker.

THE JOHNSON STEAM REPRESS.

THE brick and tile press here illustrated is specially noticeable for its strength and simple design and its entire freedom from complicated motions. In the above respect it claims more than usual attention.

The pressure on the brick is given by a powerful lever of 2½ to 1, which is connected to the pressing head by a rigid link. The pressing head works in a V shape and adjustable slide, so that the action of it is perfectly true. The brick is fed into the mold of the press automatically by an arm which receives its motion from horizontal rocking shaft, which in its turn is actuated by a double lever and cam fixed on the side of the main wheel, which gives to the feeding arm a slow and steady motion while feeding the brick to the mold, and a quick return motion and a rest to allow the brick to be placed on the table ready for it in its turn to be fed into



the mold and pressed. The mold is sunk in the table and the brick, when pressed, is raised flush with the surface of the table ready for being delivered to a convenient position for the attendant to load it away. The brick is both fed to the mold and is delivered automatically. The arrangement for lifting the brick out of the mold is by a lever which rocks on a gudgeon and is actuated by

a plain cam attached to the opposite side of the main wheel to the one actuating the feeding motion, which in its revolution presses the lever down, and the weight of the opposite end, after having delivered the brick, brings it back again to be in readiness for lifting the following brick.

Every part of the machine is open and of easy access, but its design is such that it is practically impossible for it to get out of order.

The mold is put together in segments which, when worn, are easily taken out and planed over the surface and put back again into their position, and the mold is new again. Thus the requirements for the heavy and rough work of a brick factory have been fully provided for. This machine is capable of pressing a great variety of patterns of bricks and tiles, and the latter in sizes up to 12 inches square burnt size.

The action of the machine in performing the work is so gentle and correct that bricks and tiles can be finished by it in perfect form direct as they are made by the usual pug mill or auger machine, and it is also sufficiently powerful for repressing bricks from the dry press.

Fire brick makers, whether by the hand or auger machine method, will find this machine just what they need. Paving brick manufacturers will have their requirements for repressing fully met by adopting it. The capacity of the machine is only limited by the speed at which the finished bricks and tiles can be removed as the machine discharges them.

Further particulars of the Johnson Repress may be had from the Somerset & Johnsonburg Manufacturing Company, Somerset, Mass., who are joint owners of the patent and the American agents.

WHAT NOT TO LOSE.

Don't lose courage; spirit brave
Carry with you to the grave.

Don't lose time in vain distress;
Work, not worry, brings success.

Don't lose hope; who lets her stray
Goes forlornly all the way.

Don't lose patience, come what will;
Patience oftentimes outruns skill.

Don't lose gladness; every hour
Blooms for you some happy flower.

Though be foiled your dearest plan,
Don't lose faith in God and man.

—[Womankind.]

A GRAND RECORD.

While discussing the merits of different dry clay brick machines, one of the superintendents of the "College Hill Press Brick Works" remarked about the celebrated *Triumph*:

"For the last seven years, and the most of that time day and night, have these Triumph Machines been in operation here, producing the finest press brick that have ever been made in St. Louis, and working with a precision of a clock."

The College Hill Press Brick Works of St. Louis, Mo., is next to the Hydraulic company, one of the leading and largest exclusively dry press brick manufacturing establishments in this country. Write to them if you are investigating the merits of dry clay brick presses.

THE ONLY DRY PRESS BRICK MACHINE FACTORY IN THE WORLD.

No brickmaker visiting Chicago should leave without going through the factory of Messrs Chisholm, Boyd & White, which is interesting in the highest degree, not only in itself, but from the fact that it is the only establishment of the kind in the world to-day. This unique factory is 250 feet long and eighty feet wide, substantially built of brick with a slate roof, and having an independent power house at one side. Five acres of ground go with the building, and as the whole lies within the city of Chicago, the value of the land alone is very great. Three side-tracks run the full length of the property, and being located on the famous Belt Railway of Chicago, the shipping facilities in all directions cannot be equaled.

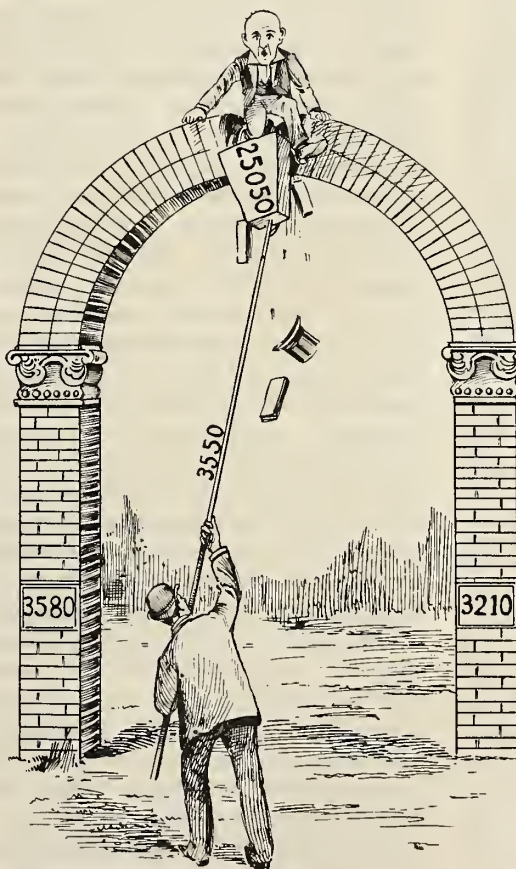
The factory is fitted up with the most modern and improved machinery that money can buy, it being a theory of these gentlemen that the man who puts the most money into his machine is the man who will get the most money out of them in the long run. Certainly it is a marvel as well as pleasure to watch some of these immense and intricate tools in operation; their motions seem almost human in their intelligence. No one can fail to be impressed with the care and skill used in the manufacture of the Boyd Machines, as well as their simplicity and perfect workmanship when finished.

The south end of the factory is fitted up for clay testing, and here machines

are kept constantly under belt, making brick out of clays, shales, etc., from every State in the Union. The whole process of dry pressed brickmaking is illustrated, in its application to all the different materials used, and the finished brick, as they slide from the molds, are polished like glass. It is an actual fact that with the brick made from some clays, just as they come from the press, a nail can be driven through a plank without injury to the brick, such is the pressure they receive.

When last in Chicago, Messrs Chisholm, Boyd & White told us that if any visiting brickmaker, whether looking for machinery or not, would call at their office, No. 320 Dearborn Street, they would take pleasure in sending one of their men with him to their factory, and explain to him fully their method of preparing and handling clays, as well as the construction of their machines. They claim that they can show a man, in an hour at their works, more about the Dry Process of brickmaking than he can learn from books or correspondence in six months; certainly the mode of instruction is an interesting as well as an easy one.

GIVE THEM A NEW COUNT.



KEYSTONE: Please help me down!

[See February CLAY-WORKER, page 245.]

AN AWFUL DEATH.

Cyrus Minnich, an employe at Facht's brickyard near Reading, Pa., met with a dreadful accident April 26. He was working at the clay crusher, and climbed upon the hopper, slipped and fell into it and was drawn down into the machine with the clay. The machinery was stopped as quickly as possible, but he died before he could be taken from the machine. His legs were hacked and ground from the body.

IN FAVOR OF BRICK PAVEMENTS.

The Utica, N. Y., observer, having heard much in favor of vitrified brick pavements from Detroit and other large cities, and knowing some had been laid in Syracuse during the past year or two, dispatched a reporter to that city recently to learn the results of the experiment. His investigation shows the people of the City of Salt, from the Mayor down to the cartmen, to be largely in favor of brick for paving above any other material. On a portion of Crouse street, paved with brick last

year, the writer found a city teamster and his men gathering up a large and heavy load of dirt. He was questioned as a disinterested party about his choice of pavements for teaming. He unhesitatingly pronounced in favor of brick, saying that were that street paved with asphalt his horses could not climb the hill with his loads, but that with brick he had no difficulty. The brick, while it presents an even surface, affords a foothold for horses. The teamster directed the reporter to another portion of the same street, where more brick pavement was being laid, and the manner of laying it was observed. In some portions of Syracuse the land was originally swampy and no natural foundation can be had. In such cases concrete is first laid, then four inches of sand compressed to two inches. On this the bricks are set edgewise close together. There will, of course, be some space between them. Over the whole, and filling these spaces, is poured a hot tar preparation, the same as is used in the laying of sandstone. A light sprinkling

of sand is then scattered over the whole. This sand and what hardened tar remains on top wears off after a time and leaves a surface of brick, ground even and smooth.

AS TO DURABILITY.

Upon first thought it would seem that brick would be too soft to stand the wear and tear, or if made harder, would chip the more easily under the pounding of sharp-shod horses. But this is not the case, however. On the contrary its power of resistance is something wonderful. The first brick pavement laid in Syracuse was in West Water street, leading to the Central-Hudson freight house, two years ago. It is on an incline and over this street all the heavy trucking to and from the railroad passes. The pavement was put down there to test its durability under hard usage. Among others in a position to speak advisedly about Syracuse paving, the writer met Mayor Amos, by whom he was very courteously received and from whom many of the details here given were obtained. The Mayor said that for a week last summer he had a tally kept of the number of loaded wagons that passed over the West Water street pavement, and it was found that it ranged from 1,200 to 2,600 per day! This heavy travel has not yet made any noticeable impression on the pavement. The reporter rode over this pavement yesterday afternoon, and saw where for the past two years heavily loaded coal wagons, two tons to the load, came down a steep incline from the coal pockets and struck the bricks lengthwise at the curb, but in no case had they made any impression upon the pavement. And under this pavement no concrete was laid—only fine gravel heavily rolled. When asked about the city's experience as to the comparative durability of brick and asphalt, Mayor Amos said that an asphalt pavement laid in West Genesee street at the same time that West Water street was paved with brick had been repaired several times, while the brick remained intact.

IF WELL DONE, IT WILL.

Advertising does not always pay. If it did, newspaper men would get too rich, and would attempt to advertise themselves, which is generally found to be contrary to their principles. An advertiser is justified in taking every precaution, but can never know in advance that his advertising will pay. Sometimes it will; often it won't. There is only one rule, however; it is set forth in the old nursery rhyme:

If at first you don't succeed,
Try, try again.

CORRESPONDENCE.

THESE COLUMNS ARE OPEN TO ALL. THE FULL NAME AND ADDRESS IS REQUIRED BUT WILL NOT BE PUBLISHED EXCEPT WHEN PERMISSION IS GIVEN BY CORRESPONDENT. THOSE DESIRING TO COMMUNICATE PRIVATELY WITH ANY CORRESPONDENT WHOSE FULL NAME IS NOT GIVEN CAN DO SO BY ADDRESSING LETTERS CARE OF CLAY-WORKER.

Begs to Differ With Keystone---Brick Better Than Granite.

Editor Clay-Worker:

Please find enclosed subscription for the CLAY-WORKER. Though not actively engaged in the manufacture of brick nor in their sale, I still feel a very lively interest in the development of the business and the improvement of the methods for their manufacture. For this reason I regard the small subscription as a very good investment. In this connection I cannot forbear expressing my sense of indebtedness to some gentlemen recently attacked in your columns by "Keystone." I should have done so before, only that I was by no means sure that Mr. Purington would feel grateful for such an expression. And truly he has demonstrated that he is abundantly able to take care of himself. His answer is just what I should expect of him, and leaves nothing to be said. For my own sake, however, let me say that I hope he will not abate one whit of his talking and writing in behalf of brick interests. His experience and wide acquaintance make his words interesting and valuable any time and anywhere. It is simply impossible for me to attend the meetings of the National Association, but I read carefully the reports of its transactions, and it is precisely Mr. Purington's remarks from which I get most that is of value and interest. It strikes me that we should congratulate ourselves that the man among us, who has had experience and acquaintance, has also a tongue.

With regard to the prospects, I can only say that they were never brighter. Never before was the demand so great, nor was there ever such a determination on the part of city councils to be early in the field. We have already shipped a large number of paving brick to Hannibal, Mo., and building brick to more points than I will stop to enumerate. It is only a question of time when brick will be the general paving material for our cities, small and great. How can we feel otherwise, when our brick are still intact upon the freight yards of the C. B. & Q. R. R. in Chicago, where they are subjected to severer usage than they could be anywhere else in that city?

Two years they have endured the test and have given better satisfaction than any other material used in that place. The brick used were of ordinary size, so that, as an expert said, it was three and three quarter inches of brick against seven inches of granite. Under such circumstances, haven't we a right to be encouraged?

T. R. WILLARD,
Galesburg Brick & Terra Cotta Co.

More Pointers for "Keystone."

Editor Clay-Worker:

Referring to the letter signed "Keystone" in February issue of the CLAY-WORKER, and subsequent correspondence on the subject, I must support Bro. Purington's demand for recount. I can only find 999 words to his credit. I would like to make it the even 1000, but George Washington-like, "I cannot tell a lie"—for one word.

All this excitement might have been avoided if "Keystone" had only profited by the "few pointers on convention conventionalities" published on page 35 of January issue of the CLAY-WORKER, for the benefit of "ambitious young delegates" of this class.

For example, when Bro. Eudaly had the floor, and to "Keystone's" thinking, wanted the earth for one of his kilns, the "glare and walk act" (No. 2) would doubtless have proved most effectual. Pose No. 3 would certainly have had the desired effect when Bro. McCain was wasting the valuable time of the Association with the discussion of such trivial matters as brick dryers; and then Bro. Purington attempted to serve any of his "warmed up chestnuts," No. 4 could have immediately been resorted to. I feel quite certain that a free and energetic use of these "poses" (ringing the changes on Nos. 1 and 5) would have accomplished all that was required.

One thing is quite certain, such a terrible state of affairs cannot be tolerated next session, and, in order to guard against the mere possibility of a recurrence of the same thing, I propose that a select committee of one be appointed, with "Keystone" as convener and chairman, to thoroughly investigate the matter, closely watch the progress of events, and properly apply the remedy as above suggested.

Second the motion!

Be it also resolved: that, in case the efforts of said committee are successful, the chairman be rewarded with the appointment of third-assistant-sergeant-

at-arms, as described in the "pointers" above referred to.

Motion carried unanimously!

All jesting apart, I am certain your readers look forward with pleasure to the publication of some more of Mr. Lederer's sketches, which are most entertaining and truly artistic.

R. M. GREER.

Tuxpam, Mexico.

P. S:—I notice the invitation extended to "Mr. P." to spend his vacation in the East, and learn how brick should be dried on the open yard. I hardly think he will make the trip with this object in view.

Is not the fact mentioned by your correspondent, (if it is a fact) that very few of the Eastern brickmakers could afford to put in artificial dryers, "even if they were proved to be beneficial" a "pretty straight tip," that the old sunshine method is not what it used to be forty years ago; and that the absence of "gaseous matter," is not always proof positive of the presence of "solid returns?"

Clay Mixtures.

Editor Clay-Worker:

"Neophyte" wants to know "if the attempt has been made in this country to make a yellow brick from a ferruginous clay by the admixture of lime either as a carbonate or hydrate."

This question I cannot answer, but as you seem to doubt his statement in reference to the London brick, I will furnish you a brief description of the process of making these brick, or rather of preparing the material, and give you my explanation of the results.

My "think shop" is in rather a chaotic state at present, as I have just moved into a new house and my effects are somewhat scattered, and my room cannot be warmed until the fire-place is finished. So I must betake myself to my brick-shop—not the best place for literary work.

"Novice" is evidently in about the same skeptical state of mind as yourself. His reply to "Neophyte," translated, is that the chalk or calcium carbonate added to the clay would decompose in the burning of the brick—the carbonic acid being driven off and lime or calcium oxide remaining—and that this lime when moistened with water would slake with such violence as to burst or disintegrate the brick. Under ordinary conditions this would be the case, but first let us examine the facts in reference to the London brick.

The earths used for brickmaking near London are not clays, properly speaking, but *loams*, containing a large amount of free silica in the form of sand and a small per centage of alumina, with enough iron oxide to burn more or less red without mixture. But the texture of these earths is so loose and incoherent from the small proportion of alumina that a mixture of calcium carbonate is necessary to bind the mass together and to take up the excess of fusing silica in the process of burning. Fortunately for the London brickmakers calcium carbonate is abundant in their vicinity, in the form best adapted for this mixture, viz., *chalk*. Were they obliged to use limestone for this purpose it is doubtful if it could be done successfully.

The chalk is ground into a pulp in a chalk-mill, and from thence is passed to a pug-mill in which it is thoroughly mixed with clay or loam. This process is called "malming," as it produces an artificial *malm*—the beds of natural *malm* having been exhausted many years. Brick made from this *malm* have when burned a yellow color.

Now, why is it that lime mixed with loam will produce a hard, durable brick, whereas the same amount of lime mixed with ordinary clay would result as "Novice" expresses it, in disintegration? Why does the addition of lime change the color from red to yellow? I have never seen any answer to these questions that I remember, and as I haven't a college library nor a college Professor within reach I propose to "evolve answers out of my own inner consciousness."

At a high heat calcium carbonate will combine with silica, forming a silicate of calcium which is not effected by the moisture of the atmosphere. Now to a clay containing a large amount of silica, calcium carbonate can be safely added in sufficient quantity to form this combination. The silica can be in excess without danger, but if the calcium carbonate is in excess a portion of it will be left over as calcium oxide, or lime, which will injure the brick. A well burnt London brick may be described as a silicate of calcium and aluminum.

It would be interesting to know just how large a per centage of chalk in a finely divided state, could be added to our ordinary clays without injury. The proper proportion could easily be determined if we had the chalk at hand. The more free silica in the clay the more

chalk that could be added with safety, but as chalk is rather scarce in this country—only existing, so far as I know, in Western Kansas—it is not likely that many of us will ever make the experiment.

Now as to color. It is probable that the effect of the chalk is merely to neutralize the red to a greater or less degree producing a yellow. It is not likely, I think, that the iron undergoes a change to a silicate—which is the condition of the iron in the Milwaukee clays. The chalk is not mixed with the London clay or loam for the purpose of changing the color of the brick; but because it is only by so doing that a good brick can be made of their earth at all. Even were chalk abundant in this country it could not be economically used for buff or yellow brick with our system of manufacture, when clays that will make naturally a buff brick are so common. If "Neophyte" will advertise in the CLAY-WORKER for such a clay I will guarantee that he will hear of more than he can buy—and not far from New York either.

W. D. RICHARDSON.

Again in Harness

Dear Randall:

Having returned from my vacation in the South I write you my customary letter, so you can notify Morrison to take his hat out of hiding and breathe easy again. As usual, I had a royal time basking in the sun of the balmy South, until (you know I was never classed as a blonde,) I was informed that all I would need would be to crimp my hair and stay.

Speaking of hair reminds me that the first thing I did on my return was to hunt the April CLAY-WORKER and gaze into its faithful shadow of our good friend Fletcher, and I note—or think I do—that he is wearing his "bang" more and more in the style of our friend Adams. I am anxious to see you and thereby find whether it is only a prevailing style of Indianapolis, or whether he has been over working his thinker.

I am glad on one account that I missed the last convention. You know even a stenographer always broke me up a good deal when I was working my chin on the suffering members, but if I had been in the presence of the cold pencil of "Keystone" with his mathematical problem my tongue would certainly have been palsied, and by the way, speaking of "Keystone" reminds

me that I should not trespass further on your crowded columns, as there are more to hear from. I feel that I had a narrow escape, indeed, and in consideration of it and to make way for some more of the brothers to get at him, I will quit right now. GATES.

It Strikes the Right Spot.

Editor Clay-Worker:

Enclosed find check for \$2.00 which please place to my credit in full for one years subscription in advance to the CLAY-WORKER. Taffy is cheap, but nevertheless you are furnishing us with a publication that is a credit to yourselves and the craft, and, like a meal to a hungry man, it seems to strike the right spot every time.

Wishing you continued success, I am

Yours Respectfully,

WALTER D. HEDDEN.

From the Great North West.

Editor Clay-Worker:

Enclosed please find subscription for the CLAY-WORKER for one year.

We cannot say very much about the prospect of brickmaking here for this season yet. In a western town where things move by fits and starts, one never knows what is ahead. When everything will be looking the bluest sometimes, some new enterprise will come in and locate and set the wheels of brickmaking in motion. The business here, however, has not amounted to anything since the fire of August, 1889. Brickmakers from all points of the compass rushed in and ruined the business. They dropped out too, and now the old timers have it all to themselves again. There are a good many of the new comers and about a dozen of their machines, good ones too, for sale. They will sell cheap, we mean the machines, but some of the owners themselves would sell cheap too, at least they say so.

Our prices are cut to the lowest notch, and no immediate prospect of anything better. There were about 8,000,000 brick made and disposed of here last year. We made slightly over our share, two million, but we have a capacity to have made all of them, and one of our competitors, the Washington Brick Company, has about double capacity. The brickmakers here are something like the publishers of brickmaking journals (present company in both departments excepted). They

howl too much at and about each other.

We would as soon think of flying as getting along without the CLAY-WORKER and it will be a cold day when any of the Spokane brickmakers do that. With best wishes for yourself and journal, we are

Respectfully,

J. T. DAVIE & Co.

Spokane, Wash.

A Move in the Right Direction.

Editor Clay-Worker:

Enclosed please find \$2.00, our subscription to the CLAY-WORKER. It is the best brickmaker's paper published. We would not do without it.

On January 5th, 1892, the brickmakers between New Haven and Hartford met and completed the formation of the "Central New England Brick Manufacturers' Association." The pioneer brickmaker, Mr. I. L. Stiles, was chosen President and Treasurer and Mr. M. E. Jacobs, Secretary. Since our organization we have met often and become better acquainted; new members have joined recently and great interest is manifested. A most friendly spirit prevails, which augurs permanency and success to the association.

The outlook for this season is not bright, still we hope to do a little at the business. The situation might have been worse had not the Association voted not to commence making until April 15th.

Wishing you continued success, I am

Very Truly Yours,

JOHN O. SHARES,

New Haven, Conn.

The New York Market.

Editor Clay-Worker:

Brother "Jasper" says that the "sun do move." The good ship, "Brick," is on the move for the season of 1892. It is not within the "ken" of men to say whether she may make a long or a very short season, a prosperous or, in some cases, a disastrous one. There are some captains very much given to carrying a press of canvass to make quick voyages; others more carefully sped or sail according to their judgment with a corresponding saving to the owner, as it costs something to replace sails that are blown away. The outlook at one time was as though the majority of captains would safely lay in the harbor until about the 15th of May. By so doing they would avert some of the dangers which so easily beset those who make brick. April 6 was the day appointed

on which the captains should meet in solemn conclave to settle this momentous question. The day came. It was a surprise to many of the "Old Sea Dogs" when a telegram was read from the "Vice Admiral" regretting his inability to attend the meeting, as he had started one of his yards. He would start "no more," but would abide by the agreement of the meeting. I am sorry to say that this man is a Jersey man, and makes brick on the Hackensack River. The Association had better make him a "Rear Admiral" and then retire him.

The slight advance in brick was something that they could not withstand. The result was the agreement to commence on the 2nd of May. The first of the month will see about all of the yards under way. I never saw the captains so loth to start as they have been this season. All the yards here are going with the exception of two, which will not make this year. I am informed that one of the yards will run three machines a day, which would look as though the season would not be long. They will likely fill up and stop.

There is a law in regard to compulsory pilotage for vessels entering the port of New York. It seems as though there should be some such law enacted for some of our captains, as they do some very unaccountable things. On our river last spring one of them put up a kiln of pale brick, with the intention of burning them hard, and hard they were, but it required a crowbar to get them out of the kiln. The same party last summer had a good competent man burning his brick, and he got the idea in his head that if he kept the man, and he was making first-class brick for him, that people would think that he himself knew nothing about making brick. He discharged his foreman and burned the last two kilns himself, with the result of shipping one million soft brick to the New York market. He has made brick here about six years, and he has not kept a foreman a whole season in that time. He is one of the "Four-year-olds;" what he don't know would fill a book.

The market is full all the time, with quite a drop in prices. Some Haverstraws as low as \$5 $\frac{3}{4}$; Up Rivers down to \$4.51 per M. How is that for prices before new brick reach the market.

The number of permits for new buildings for the first three months of this year shows no improvement over 1891, and some of the large buildings going

up are using iron for partitions, thus lessening the consumption of brick. At present the outlook is black, indeed.

Four years ago the Republican manufacturers were using all their powers of persuasion to induce their men to vote for Benjamin Harrison, as we would then have, they said, an \$8.00 market. Instead, the prices have ruled lower than for many years. They do not say much about it at present, I hardly think they will again say, "Vote for 'Benny' and you will have good times." It reminds me of the cry during the Grant campaign, "Forty acres and mule" to the colored brother, and to the laborer at the North, "Two dollars a day and roast beef." As you may remember, the country never had such a financial depression as from '73 to '78. Before election time this season all men connected with the trade in this section will, I think, have plenty of spare time to inform themselves on all matters political. The season will be long remembered by both laborer and boss.

A. N. OLDTIMER.

Hackensack, N. J.

An Apt Comparison.

Editor Clay-Worker:

Please find postal note for CLAY-WORKER for 1892. Please excuse me for not sending it sooner. The CLAY-WORKER is a little like my boy, very good, very precious, improves with age and missed very much when not in the house.

Very Respectfully,

Johnstown, Pa.

A. G. OSMAN.

An Apprenticeship of 46 Years, yet is not too Old to Learn.

Editor Clay-Worker:

Your favor received to-day with bill enclosed for 1892 for the CLAY-WORKER. I am glad that you notified me, as I did not know exactly when my time was out, as I had mislaid my receipt. I am well pleased with the CLAY-WORKER and think that every one making brick should take it. I have been making brick since I was 8 years old and will soon be 54, so I think I should know something about them practically, and I love to read the articles of such men as Cray and Morrison. They always have a great deal of common sense in them.

I received a copy of the *Brickmaker* a short time ago and from the statements in it one might think the CLAY-WORKER would be "where the woodbine twineth" very soon. From your prosperous ap-

pearance guess this hardly true. I hope you will continue in your good work, for I think the CLAY-WORKER is a good journal.

J. T. MOORE,

Osyka, Miss.

St. Louis and Vicinity.

Editor Clay-Worker:

The figures relating to the brickmaking business in St. Louis, recently published by the Census Bureau, make an odd showing. In 1880 there were 45 yards, whereas in 1890 there were but 38. These 38 were operated on a capital of \$2,531,000 against \$727,250 for the 45 yards of 1880. The cost of materials in 1880 was \$307,581; in 1890, \$877,619; value of product, 1880, \$701,032; 1890, \$1,691,692. Number of hands employed in 1880, 940; in 1890, 1952. These figures show very plainly the great development of the Hydraulic Press Brick Co. The estimate of this Company, of the output for '92 is 250,000,000 brick, of which they expect to make 150,000,000, or 60 per cent. This is an increase over their last year's product of about 10,000,000.

Present prices on merchantable brick are very unsatisfactory, ranging from \$6 to \$6.50, and considerably more selling at the former than at the latter figure. This price is just about the actual cost of delivering brick at a job, and there is little prospect of its being any better for a long time to come.

Brickmakers have been considerably hampered this spring by the weather. In March and April it rained almost incessantly, and building operations were delayed. It cleared up the latter part of April, and everybody wanted brick at once, and enough teams could not be secured to deliver them.

At the different yards for the past three weeks they have been making preparations to get in clay, but just as the ground was plowed, and everything was in readiness, it would rain again.

The Illinois Supply and Construction Co. has been exhibiting an activity very creditable to the young men who compose the concern. They have secured control of the Broadway Brick Works, added several improvements, and are working it to the full limit of its capacity. They are building up an excellent business, and find a market for all the brick they can make. In addition to the Broadway yards, they expect to have the new yard at Collinsville (Ill.) to be known as the American Hydraulic Press Brick Co. in full operation by August 1.

Their Koch Hydraulic Press is being put up as rapidly as possible. It will also be equipped with the Grath Patent Kiln. At this yard they will make only stock, ornamental and paving brick. They have an excellent quality of shale clay, and with the Koch press they make an excellent paving brick. It is absolutely impervious to moisture or frost, and is as evenly pressed as a hard red. The capital stock of the new company is \$100,000, which has all been subscribed.

The reports from the Grath Kiln at Newbern, Ill., are very flattering, and Mr. Grath states it will burn fully 90 per cent. stock, something never thought possible.

Anthony Ittner's St. Louis and Belleville yards are in full operation, and Mr. Ittner expects to run both yards to their full capacity—27,000,000. In both yards he uses the Andrews presses and Alsip up and down draft kilns. He will be in the market strong on ornamental brick this year, as his Belleville yard can turn out 2,000,000.

Mr. Ittner has been in the brickmaking business 33 years, and has been successful from the start. For the greater portion of this time, he also carried on a building business, leading this branch of trade. His sterling qualities as a citizen were fittingly recognized by the people by his election to the 45th Congress. He has retired from the building business, and now devotes his entire attention to his two yards, which are models.

In tiling, sewer pipe, etc., business is very quiet, and but little can be said. There have been many inquiries, and the season has been full of promise, but so far, that is as far as it has gone. The bad weather which has prevailed all over the country is, without doubt, the cause of this, and it is reasonable to anticipate a heavy demand when the weather once becomes settled.

The Winkle Terra Cotta Company are showing signs of prosperity in the erection of a three-story 75x100 addition to their factory, and also a new modeling shop, which will give them one of the best equipped plants in the country. Work is piling up on them very rapidly. The latest contracts they have secured are the Benoist (6-story) building on 11th and Olive Sts., and St. Joseph's Catholic Church, at Lebanon, Ill. They are about to begin work on the Knox building, which will be a magnificent

structure, and calls for a great deal of the most artistic kind of terra cotta work.

The Hydraulic Press Brick Co. is building a new yard at Menominee, Wis., which will have a capacity of 8,000,000. Menominee is close to St. Paul, and it is with an eye on the business of the Twin Cities this yard is established.

The Illinois Supply & Construction Co. have removed from the eighth to the second floor of the Odd Fellows' building, where they have roomier and handsomer quarters. **TERRA COTTA.**

We Hope So.

Editor Clay-Worker:

Enclosed please find P. O. Money Order for \$2.00 subscription to the **CLAY-WORKER** for one year.

Business outlook here is fair for the season. Several large buildings have been let.

We placed a Triumph dry press machine on our yard late last season, and are now operating same which gives us, together with our old plant, a capacity of 50,000 per day.

St. Joseph is quite a city for brick-making, the daily output being about 350,000. We have two dry press plants and two vitrified paving brick plants besides numerous hand yards. We think the paving brick industry in this vicinity is destined to be one of great magnitude in the near future as we have shale in abundance and easy of access.

Will try and let you hear from us occasionally hereafter.

FELLING & HAGEDORN.

St. Joseph, Mo.

A Very Promising Outlook.

Editor Clay-Worker:

Enclosed find \$2.00, my subscription to your valuable paper—the **CLAY-WORKER**.

The prospects at this place are very favorable for fire brick. There is a great demand, as we already have orders in for about 400,000. Brick, gas retort orders are coming in fast. The capacity of our retort house is 1000 retorts down at one time, and we are compelled to build additions to our factory for 1000 retorts more, so we are now compelled to fill the largest orders in the shortest time of any factory. Sewer pipe business is also flourishing. We have two presses running on pipe and cannot fill our orders. Fire proof material is also in good demand. The prospects are that

the coming season will not balance the year of 1887, when we shipped 2,500 cars. I, also, think that the demand for red brick will exceed that of all previous years.

A SUBSCRIBER.

St. Louis, Mo.

Philadelphia News.

Editor Clay-Worker:

The prospect for a brisk season for the brick trade is very encouraging. It is claimed that building, as a business, is gradually resolving itself into more stable conditions, and that the speculative, take-chance element has largely quit the field. There is no doubt but that building, that is in smaller dwellings, was largely overdone, and the natural consequence of which was a dull season in 1891. The ratio of increase in population, as established by the last census, is equal to about 6,000 new houses yearly, or a little less than the amount of construction work done this year, and it is safe to say that at least this number will be erected this year. There are also more large buildings, public and otherwise, on the architects' boards that will be ready to erect within a very short time. Of course this means more business for the brickmaker. So there is no sense at all in predicting a dull season for 1892.

The first labor agitation of the season has started with the brickmakers of this city, who have received notice from their employers that their wages will be reduced as much as 28 per cent. Molders who had received \$3.25 per day last year were notified that \$2.50 would be their wages this year, and that men formerly receiving \$2.00 would be reduced to \$1.75 per day. Off-bearers were to receive \$1.45 and \$1.00, the former rates being \$1.75. This has had the effect of causing uneasiness among the men, and one yard has struck and probably others will follow. The journeymen claim that this is a most favorable spring for selling brick, and as the stock in the various yards is low the reduction, they claim, is untimely. On the other hand, manufacturers state that the low prices at which bricks are selling makes it necessary to reduce expenses.

On the 10th of April Samuel P. Miller, of the firm of S. P. Miller & Son, died. He had been complaining for a period of two years, so that his death did not come wholly unexpected.

The business of manufacturing red

and fire brick presses, patent steam repressing machines, clay tempering machines, and the tools in general use for brickmaking, 309 South Fifth street, of which he was the head, was established by his father in 1812, and has continued on the same premises ever since. The business will be continued by his son.

Architects are beginning to very generally break the monotony of the rows of red brick buildings by introducing bricks of other colors. It is somewhat more expensive, since the clay pits about Philadelphia all produce a red brick, but with cheapening rates of transportation, we are likely to use more bricks from a distance. A striking building, with its buff brick and stone, will be the Reading depot, and quite a number of handsome dwellings in West Philadelphia have their fronts adorned with the finer quality of vitrified brick, the coarser grade of which has come into very common use as a paving brick. The great advantage of the yellow brick is that it will not turn, and the mortar will not whitewash, and the yellow brick is believed to harmonize better with the landscape than the standard red.

The Peerless Brick Company, Murrell Dobbins and Jarden Brick Company report business fairly active. In fact the Peerless Company are very busy, as they have a large contract with the Reading Railroad Company to supply the buff brick and also fancy designs in brick for the new depot. **ANON.**

A Long Haul.

Editor Clay-Worker:

Enclosed find subscription to the **CLAY-WORKER** for one year.

I desire to say that I am well pleased with your paper and with your success.

In regard to our business, will say that we are making between 6,000 and 8,000 brick per month and expect to do better later on. We are making vitrified brick from shale that is 800 feet below the surface. It is mined out in order to get the coal that lays beneath it. I have had a great deal of difficulty with swelled brick heretofore, but for the last three months my burns have been very fair. Our brick are somewhat tougher than soap stone brick, but are not as fine a color. We have a demand for all we can make, and from present indications it will continue so for some time. **JOHN GAFFY, Supt.**

Midland Brick Co.

Lansing, Kan.

A Plan For Brick Kiln.

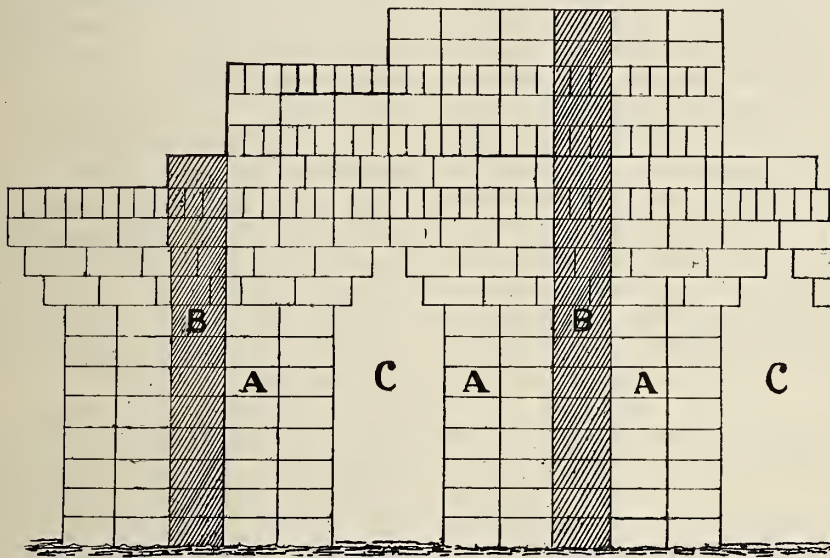
Editor Clay-Worker:

Some of your many readers may be interested in a brief description of my method of setting brick. The accompanying sketch of plan of brick kiln which I am using, illustrates the principal feature. It works well and is more economical in the ordinary way.

a a a are two brick benches.

c c are fire flues or arches.

B B are a one brick wall between the benches *a a a*, stacked close together so as to confine the fire of each arch in its respective arch, which insures a more even burn than the usual plan. These walls commence at the floor of kiln and extend as high as the top of the kiln.



My benches are five brick thick, including the high walls, and there is the length of six brick between the walls, thus allowing the brick to be set in any size tier, and have them fill the arch even. These walls are built up of unburnt brick, as the kiln is built and each arch is independent of the other arches. My observation in this plan, is, that a greater quantity of brick can be burned, with less fuel, than in the usual way. C. C. S.

Rapid Work.

Editor Clay-Worker:

Enclosed find postal order for my subscription to the CLAY-WORKER.

In answer to Edward Brown in March issue of the CLAY WORKER, will say that I burn brick with coal in down draft kilns in three to four days including water-smoking.

I would like to use the heat from cooling kilns to dry or water-smoke kiln near by, using the same smoke stack. The stack being hot would

assist in drawing the heat. There being no soot or dampness in this kind of heat, it would be a great saving in fuel if we can use it for this purpose. Would be pleased to hear through the CLAY-WORKER from any one using the above method.

JOSEPH HICKSON.

Mt. Gilead, Ohio.

Brickmaking on the Mississippi.

Editor Clay-Worker:

You have several subscribers in this city, amongst which is your humble servant, but I fail to remember of having seen Quincy mentioned in your columns during the past year.

Your scribe takes a trip through the East every once in a while, and it strikes

"Spring," has been the meanest man on earth this season, not only that his partner "Rain" played smash with all the brickmakers hopes for an early opening of exercises; don't, for goodness sake, say anything about that mean prowler of the night, "Jack Frost." He stole into our yard one night last week blew his belicied breath over about 25,000 brick made that day and then sneaked off parts unknown. In the morning I came on the yard with a kind of a "behorn-swoggled" look (if you know what that is) I lifted a few brick off of the pallets. and, "By Jove," the whole batch had been frozen. Upon dispersing from the sheds I heard a feeble voice grinding out that doleful tune of "Sinbad." There are moments when one wants to be alone—this was one of them. In the winter, to make mud brick, is a most uncertain trick. I spent the rest of this day with several men filling ditches and such like.

If this keeps on we may have good brick weather by the first of August or September. Prof. Foster says its all governed by planets and such things, but I know the brickmakers, in these parts, wish somebody would knock Mr. Planet's eye out, or lay him out cold, or anything else, to do away with him for about six months anyway. The hand yards are catching it in superabundance, poor fellows, their wash brick are no longer wanted. They may just as well make up their minds to join the big procession of advancement, or lay that little plaything, the "two-brick mould," on the shelf, together with that 3,000 task. They tried their utmost to kill the machines, but things didn't go their way. Reaction has set in, machines have their turn now. Listen to the thunder, brother hand yard, get up from your cosy couch and take in your brick.

Quincy, Ill.

GRAN U. LATER.

A Good Investment.

Editor Clay-Worker:

Please find enclosed order for \$2.00. I am only an employe, but I think what I have invested in the CLAY-WORKER has brought in splendid dividends. I am foreman of a small yard making about 900,000 annually on an old standby, Grand Automatic. The competition is great but the color sells them as fast as we can make them. Last season was dull, but we are looking for a fair seasons trade this year.

Wishing you and the CLAY-WORKER success and hoping it will continue to fulfill its duty in elevating the brick industry, I remain

Yours Truly,

Carthage, N. Y.

C. HOUGHTON.

me it would be a good idea to drive him out this way a spell, and let him gaze on a real live Mississippi River town and a real live lot of brickmakers. We have one of the best and prettiest towns on the whole length of the stream. Business in our line is always good here, notwithstanding the fact that there are thirteen yards located here and all digging for a living and something to wear. Included in these yards are three large steam yards, one small soft mud steam yard and the rest are all hand yards. The output of the three layge steam yards is about 80,000 per day, of which 50,000 are fine dry press brick. The small soft mud yard makes about 10,000 and all the hand yards combined make 60,000, making a daily output of about 150,000 brick. There will be several miles of brick sewer built this year and a great deal of street paving done. Brick is our material for street paving. It pleases everybody, because it is value received and no mistake. This fellow

Points About Roofing Tile and How to Make Them.

Editor Clay-Worker:

I had hoped that what I last wrote on Roofing Tile would have been my last communication on that subject, as I fear my remarks in that line are acquiring a decidedly chestnutty flavour, which, no doubt, has been detected by your many readers, but I continue to receive so many enquiries on the subject that, though I have replied to each direct, I must ask permission to say a few words more through your columns, for the benefit of any one seeking information on these points.

Before proceeding further, I wish it distinctly understood that I do not claim to be, by any means, an experienced tile manufacturer, and give my ideas for just what they may be worth.

I am asked if the French roofing tile referred to in my previous letter, is patented, and if the manufacture of it would be an infringement. I answer, most decidedly not. If asked regarding patents on roofing tile, I would give it as my opinion that this is an article on which it would be quite impossible to obtain a valid patent any where. If any one can mention a single feature in a roofing tile, which has not in some form, been in practical use for centuries, I, for one, would be glad to know what it is. In connection with this subject I would say, that, in my opinion, one of the great advantages of tile for roofing, is, that it can be made by each local manufacturer, who can supply his own district, unfettered by heavy freights or absurd royalties, and so be enabled to place his product on the market at a price which will at once successfully compete with all rival materials, which though vastly inferior in quality, have been habitually used by the public, which always requires some very apparent advantage to induce it to make a change.

Our correspondent wants to know if common clay will make roofing tile, or if fire clay is a necessity. Mr. Gibson, whose writing compels me to rank him as a very high authority on the subject, seems to think the "impregnation of fire clay" a valuable feature in the manufacture of roofing tile in France. Every one must, however, "cut his coat according to the cloth;" so I would say, begin making your tile of what you consider the most suitable clay available,

and experience will soon teach you what is best. I should think any clay which will work well on a stiff mud machine, will turn out a tile which will, at least, make a better roof than can be made of any other class of material.

Another writer asks how I prevent the tile from warping and cracking after it is placed on the pallet. It is too late to prevent the tile warping and cracking *after it is placed on the pallet*. The proper time to remedy this evil is at the selection and preparation of the clay. Very much, however, can be done by care and patience in drying. The slower the operation is performed, the less liability there is to warp and crack. I also consider it a good plan to have an intelligent man, or smart boy, who will soon become expert, go over the tiles a few hours after they are placed in the racks (just as they show signs of beginning to set) and see that they are all straight and true. The racks should be made with this in view, to hold a double row of tiles with the top of the tile to the outside. With intelligent care and experience the trouble of warping and cracking can be completely overcome. A very good pallet for roofing tile can be cheaply made out of lath, three rows so spaced as to support the ridges of the tile.

All engineers invariably ask: "What machine do you recommend," and "what presses do you use?" These are points each manufacturer must decide for himself. There is a large and complete list to choose from in the advertising column of the CLAY-WORKER. Personally I have had experience with only one kind of press—The Raymond "Perfection,"—and, though I consider it faultless for this class of work, I have no doubt there are many others which will answer the purpose equally as well.

Many questions are asked regarding burning. This is a subject I am afraid to tackle. Well aware of my long-winded failings, I fear if I once start on it, I won't know where to stop; and I have already trespassed too much. Later on I may ask you for space to air my heresies on this vexed question.

Above are only a few of the many enquiries which it has given me pleasure to receive and answer to the best of my powers, as it shows that the subject is attracting some attention. I would however, suggest, that enquirers first read carefully what has been written on roofing tile in the last eight or ten issues of the CLAY-WORKER. These, I

think, contain nearly all the information needed. I must say I consider this journal absolutely indispensable to every manufacturer of clay, who does not court the unenviable distinction of bringing up the extreme tail end of the procession.

R. M. GREER,

Tuxpam, Mexico.

P. S:—The use of tile roofing, and indeed of all clay ware, should be agitated in the local press as well as in the trade Journals. There are very few districts in which some member of the craft could not have this accomplished. Tile is the ideal material for roofing. All others require more or less attention and are comparatively short lived. When a person has put on a good tile roof he can (like the man who gave an I. O. U. for the amount of his indebtedness) say "thank God that it is settled," and sleep the sleep of the just.

Items from the North West.

Editor Clay-Worker:

The writer has recently spent several days in the West and North West visiting brick plants, inspecting street pavements, etc., etc. It is fair to say that the "Etc., Etc." means being almost stuck in a snow-drift in Northern Iowa about the 14th. ult.

I had heard a great deal about the Purington Paving Brick Plant and other paving brick plants at Galesburg, Illinois, so I determined to see them, and I did, though on a very rainy and disagreeable day. I found enough cheer and bustle about either one of these plants to carry an ordinary community through a severe financial panic. Certainly the brickmaking industry at Galesburg indicates thrift.

The following are some of the utterances which greeted my ears:

"Are you going to organize a brick plant here? If so put me down for some of the stock."

"How much?" "Oh, any reasonable amount. I am sorry I did not get a chance at the other company."

"Then I am to understand that the brick business pays in this locality."

"I should think it does! You cannot buy a dollar of stock at any reasonable price. All the yards have more than they can do, and many of our people are anxious to put money in a new company."

"Are you not afraid that the business will be over done?"

"Not at all. We could have sold a three million order to-day if we could have

furnished the brick."

"The towns and cities within shipping distance of Galesburgh have scarcely begun to pave in comparison with what is to be done, besides the time is coming when many of our country roads will be paved with brick."

"Brick is the cheapest, best and most durable pavement for this section of the country where clay of a superior quality is to be had in abundance and other paving materials are very scarce."

A little incident at the hotel illustrates the universal sentiment on the street improvement question, not only in Galesburgh but in most every other Western city.

Being disappointed in not getting a train for Burlington at the hour desired, the genial clerk at Brown's Hotel suggested that I could walk to Burlington if I could get out of Galesburg, meaning that many of the streets were so muddy that they were impassible, which I found to be the case. Yet they were no worse than they were seven years ago when I stopped at the same hotel and heard nothing of muddy streets.

The fact is, Galesburg has several brick paved streets and the unpaved ones cannot stand the comparison.

I was disappointed in not being able to see my friend Will Purington. Was told he was at home sick. Desiring very much to see him I ventured a word through the telephone and heard the pleasant voice of Mrs. Purington:—"Will is sick." "Is he too ill to be seen." "The doctor thinks he should be kept quiet for a day or two." "May I ask what is the trouble." "Well,——" (Hotel Clerk—"He's got the measles.") So I ventured—"He has the measles, hasn't he?" "Yes, so the doctor says." "Well, please give him my regards. I do not think he should be seen to-day."

In fact I am one of the many that feel disposed to "pass by on the other side" of measles, scarlet fever and other kindred *children's diseases*.

At Burlington I spent a short time with Mr. Neis, manager of the Granite Brick Company. I found this company unable to fill its orders for pavers.

Though the plant is now being run to its full capacity, and has been in fact, since its erection, Mr. Neis informed the writer that they are manufacturing a form of brick especially adapted to hill-side streets. The pattern is very simple and easily made. A number of the hill-side streets in Burlington have

been paved with these bricks, giving excellent satisfaction. I was unable to examine any of these pavements on account of the lateness of the hour.

Taking a sleeping car for Des Moines I awoke to the light of one of the most disagreeable days I ever experienced wind, snow, rain and mud. My umbrella was of no use on account of the wind. Though an abundance of snow, its purpose failed because of the rain, and the rain was not needed because of the mud. Hotel clerks and police refused to direct strangers to any part of the city unless it was first clearly demonstrated that said place was situated on one of the lines of electric railroads or a paved street.

It is fair, however, to state that Des Moines has several very elegant brick paved streets, and that the contracts are already let for a number of others.

It was suggested that "the proper time to petition the City Council for street improvement was in the rainy season."—*A valuable suggestion!*

We called on Mr. John McGarrisk, president and manager of the Capital City Paving Brick Company. This company is now greatly enlarging its plant by the addition of machinery, down draft kilns, etc., etc.

Mr. McGarrisk has also taken the contract to lay several million of street paving brick in Des Moines this season.

I called on Mr. S. A. Robertson, a brick-maker of forty years experience, (however, he began the business early in life). Mr. Robertson is president and manager of the Des Moines Paving Brick Company. This company will soon have doubled its already large capacity by the addition of a large 250 horse power Corliss engine, boilers, brick machines and six additional Eudaly kilns, etc.

Mr. Robertson is very proud of his plant and well he may be. The splendid arrangement and perfect construction of the plant makes it a model throughout. Mr. Robertson's long experience has enabled him to systemize his methods of handling the material from the cars, for shipment, to the very best advantage.

The plant impresses one as to the method of mining and delivering the clay to the dry pans, from the pans to the pug mills, machines, dryers and kilns as being very complete and convenient. The kilns are to be 12 in number, of 230,000 capacity each, stand-

ing at right angles to the main lines of four railroads, two on each end. This gives shipping facilities superior to most brickyards.

The arrangement of the kilns differs from that at the Purington plant in this; at the Des Moines plant the kilns stand at the end of, and at right angles to the dryers, while at the Purington they stand at the end of, and parallel to the dryers.

Mr. Robertson has reduced the loss of materials in the process of manufacturing to a minimum.

I think I have never seen a brick plant with fewer bats or inferior brick.

I made some inquiry as to last season's profits, and while such matters should no be made too public, I learned enough to state that the company is not in debt, and has almost doubled the plant in a year.

We think prospective brick manufacturers would do well to visit Des Moines and save much experimenting.

From Des Moines we went to Minneapolis. In Minneapolis the man who talks brick, street improvement, or anything but "National Republican Convention, hotel accommodations, rapid transit to St. Paul, etc.," is immediately ordered to leave town.

While the above is a rule I succeeded in interviewing our old friend, J. K. Caldwell, personally known to many of the clayworkers of the United States. Mr. Caldwell has very valuable clay properties at Menomonie, Wis., on which he proposes to organize and build a large dry press brick plant this season, known as the "Hydraulic Press Brick Plant."

The machine is now being built in Chicago and promises great results. Mr. Caldwell thinks this company will also go into the manufacture of street pavers, having on the same property a very fine deposit of clay especially adapted to the manufacture of vitrified brick.

"The Standard Menomonie Brick Company," main office at Minneapolis, has been recently reorganized with additional capital, under the management of John F. Byers, who is remodeling the plant, adding improved Simpson Dry Press Brick Machines, and Eudaly Down Draft Kilns, etc.

The Menomonie Press Brick Company is also greatly improving their plant this season.

Space will not allow the going into detail in reference to the brickmaking interest at Menomonie. This being a great brick center the craft in the North West will do well to visit these plants, especially as there can be seen almost all kinds of manufacturing, common brick both hand and machine, also press brick both re-press and dry press, and before the season ends paving brick by the stiff clay process.

W. X. Y. Z.

THE CLAY-WORKER.

OFFICIAL ORGAN OF THE NATIONAL BRICK MANUFACTURERS' ASSOCIATION OF THE UNITED STATES OF AMERICA.

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T. A. RANDALL & CO.,

81 Massachusetts Ave. Indianapolis

THE CLAY AGE.

In an article on "Fire Risks on Tall Office Buildings," Edward Atkinson says: "May we not now be about to enter upon the Age of Clay, having passed through the several phases of timber, light wood, iron, granite and steel? One may almost venture to say that we have, as yet, no science applied to brick; no science applied to mortar or cement; no true art of construction in brick, fire clay and tile. We are groping our way to find out how to use our huge abundance of the best material and to adapt them to the climate and conditions of this country. One can, even now, conceive of a building of the Moorish tile construction, finished inside with wood pulp rendered incombustible, or with terra cotta, or other forms of clay, walled within plaster board, covered on the outside of the roof with indurated fibre tiles, light, strong, and impervious to water. The elements exist, even now, which, when combined, may render it possible to construct a building at low cost which will be sufficiently fire-proof to resist the combustion of its contents." In speaking of the high buildings he says farther: "If I am rightly informed, the tall office buildings under consideration are virtually steel towers, veneered with incombustible material. It is very plain that if the inside finish of such buildings is also of incombustible material, including floors, moldings, and every other element, then the internal hazard will consist only in the possible combustion

of office furniture, books, papers and other contents. Such hazard will be perfectly suitable for an insurance company to take at a very moderate rate of premium, but the unknown element in the case is the outside exposure. These buildings are surrounded with others more combustible, which, when ignited, develop intense heat. The instances of complete destruction of so-called fire-proof factories, store houses, grain elevators and other buildings composed mainly of iron and brick are so numerous as to have given underwriters a profound distrust of iron or steel, unless so thickly encased with non-heat conducting material as not to be liable to be heated to the point of dangerous expansion."

In going into this matter in a detailed way, Mr. Atkinson, who is, no doubt, the best authority in this country on good construction, concludes with this statement that he thinks we are now about to enter upon the age of clay, which we, who have been interested in it, are glad to welcome. We see and know the reason why the clay age is the coming age in building construction, and are pleased to see our opinions justified and endorsed.

BUSINESS PHILANTHROPY.

All men are working for other men, says one who has seen life broadly. No one does a good thing for somebody else if he does not do the right thing for himself. It is not possible to separate general interest from individual interest. Industry, integrity, patriotism and friendship are expressed through labor for others. So says the modern philosopher. This is good all-around philosophy; it is good brickyard philosophy. The man who makes a better brick to-day than he did yesterday does a good thing for his neighbor. He is moving the world a little farther along. His neighbor, his friend and the rest of the world profit by it and so does he. The invention of new brickmaking machinery that makes a cheaper brick than has been made before, adds to the world's wealth, and it adds to the world's comfort. It enables people who build to build better houses; to build them of better material. In that way the inventor is a philanthropist; he is charitable; he helps the world. It is the kind of charity and philanthropy that the world is moving towards. It is business philanthropy. Nothing is ever done very well for any great length of time that does not pay.

The charitably disposed man who builds houses and rents them to poor people for less than they are worth, soon tires of his bargain. But the one who makes cheap brick and enables cheap houses to be built, so they may be rented profitably at a moderate cost, is, after all, the real philanthropist. He helps to give the people better houses; he gives many people employment in building them; in making the brick, and is all around the highest type of a man. He is working for the welfare of the world; he is prospering himself, and altogether the operation is entirely just and satisfactory, because it contributes to the benefit of all.

TELL THE TRUTH AND SHAME THE DEVIL.

The man who said, "Honesty is the best policy," was one of experience. People do not make statements of this kind from the experience of others. There must be a touch of personality in them. Benjamin Franklin was not an advertiser, but he had had experience in other ways. There was a time when people thought it smart to exaggerate in advertising. They thought that the people expected it and would discount it properly. But the heavy advertisers have learned that this will not pay. They know that it does pay to tell the exact truth when they buy space in a newspaper or a trade journal and write the matter themselves. One who advertises an untruth is taking a very quick way to advertise himself out of business. The advertiser who tells the exact truth is building up a good business. Business men know that they cannot afford to disappoint their customers. They know that it is a great deal better to represent all facts to their customers. After that the customer will determine the true state of affairs. In so far as the statements of the advertiser are carried out, thus far will he maintain the confidence of his customer, who is not to be disturbed in his relations to a reliable dealer. The editor of the CLAY-WORKER knows, from experience, that the only advertisements he may expect to continue in his paper are those wherein the advertiser tells the exact truth. He knows perfectly well that no trade journal ever had a lying advertiser as a regular patron. People soon find him out, and in a short time he is without money or business to justify advertising. He has practically advertised himself out of business. He

has disappointed his customers, and they will have no more of him.

WHOSE FAULT IS IT?

Our streets swarm with idle boys. Whose fault is it? In some cases the parents may be to blame, and in some the boys, but in most cases it is the tyranny of the Trades Unions, which will not allow boys to work at any skilled labor, except as they dictate. Not long ago the widow of a carpenter went from place to place to find employment for her two boys, aged fifteen and seventeen respectively. When advised to put them to trades, she answered, "That is what I have been trying to do, but the unions will not let them enter any shop." Little did their father think that by supporting the union he was providing for a life of vagabondism for his boys. Some time ago three newsboys in Chicago, guilty of no misdemeanor, requested to be arrested and sent to the Bridewell, giving as their reason that they wanted to learn trades, and could find no place outside the House of Correction. This is a sad condition of affairs, and can not be continued without great harm to the country. It is to make a nation of vagabonds.

OBITUARY.

Louis Wahl, one of the best known and most respected of Chicago's brick manufacturers, died at his home April 25th, after a long illness. The deceased was born in Germany, Oct. 27th, 1830, and came to America fifteen years later, and for many years has been a resident of Chicago. One of his characteristics was a stanch advocacy of all things American. After returning from a visit to the fatherland a few years ago he said: "I cannot understand why people want to visit Europe. This country is good enough for me and when I was in Germany I said that if the good Lord would let me get back I would never leave America again." He possessed fine qualities of both head and heart and his death is sincerely regretted by all who knew him.

Ralph Spencer, Dresden, Ohio, writes that he is building new works at that place for the purpose of manufacturing brick and tile. Expects to be in operation by August 1, 1892. Will put up a dry house 30x50, three floors, with a capacity of drying from 15 to 25 thousand and every ten hours.

A BRICKMAKER HONORED

A. O. Jones, of Zanesville, Ohio, was recently appointed a member of the Ohio Board of World's Fair Commissioners by Governor McKinley. Mr. Jones is well known among brick and tile manufacturers of his State, having served them as secretary of their State Association for several years. In speaking of the appointment, the Zanesville Recorder says:

"Mr. Jones is a man thoroughly competent for the position, and will go as a representative of one of the largest industries of the State. He will see that the manufactory of clay goods from the State of Ohio has the room for the display of which it is deserving. He is energetic, and generally succeeds in carrying to a successful issue everything he attempts."

MANY ARE CALLED, BUT FEW ARE CHOSEN.

The financial agent of a great insurance company, in a city of a hundred and twenty-five thousand inhabitants, recently died. The manager of that company went to that city to appoint a successor. Out of twenty or thirty applicants for the position not more than two could be regarded as eligible. The capable man in any walk of life is rare. The capable boy is rare. It is a very difficult matter to get a good office boy or a steady, capable fellow to run an elevator in an office building. Really good laborers are scarce. We sometimes think about over-crowded professions, or an over supply of help in many directions. The supply of really capable help of any kind is limited. A first-class superintendent of a works of any kind is very difficult to get hold of. They are rarely out of a job. A man who is out of a job is open to suspicion. The best and most capable help come out of the workshop—the steady, quiet, capable fellows. There are not many of them in any establishment. Generally one of good judgment can pick a leader from a gang of men. He will need a little coaching, some help and some patience. But he is nearly always to be found. When such an one is discovered the great work has been done. A man has been lifted up from a lower plane to a higher one; his horizon has been enlarged; the world has grown bigger for him. Nevertheless, the really capable man is rare, and in this prosperous period he is seldom if ever out of a job.

TRADE LITERATURE.

THE BRITISH CLAY-WORKER is the title of a new trade journal published monthly at 222 Strand, London, W. C. England. We gladly welcome this new contemporary. Further we feel to commend the good judgement of the founders in the selection of a name—"The British Clay-Worker." We have always felt a modest pride in our own name—the CLAY-WORKER, and now after many years to have our name confirmed by so promising a publication from the Mother Country is highly gratifying, for 'tis truly said that imitation is the sincerest of flattery. The CLAY-WORKER is a comprehensive title embracing the entire field of this most ancient and useful art. In both matter and make-up this new journal gives promise of much future usefulness. We wish them unbounded success. The subscription price is \$1.75 a year.

WE ARE INDEBTED to Anthony Ittner of St. Louis, Mo., for a copy of his 1892 Pocket Catalogue of Pressed and Ornamental Brick. It is a handsome little book bound in morocco with gilt title, and contains illustrations of all the various forms of pressed brick which Mr. Ittner makes in almost endless variety. It also contains views of both his yards at St. Louis and Belleville, which have a combined yearly capacity of 27,000,000 brick. Those of our readers wishing fine pressed or ornamental brick will do well to send for a copy of his catalogue—See his ad. on page 576.

CLAYWORKING MACHINERY is the title, handsomely embossed in silver upon a dark green back-ground, of a valuable catalogue just issued by H. Brewer & Co., Tecumseh, Mich. This is one of the oldest and best known firms of clay machinery manufacturers in America, and as may be supposed, their catalogue embraces almost everything in the line of brick and tile machinery. Copy will be mailed free to any of our readers who will write to them for it mentioning the CLAY-WORKER.

C. W. RAYMOND & Co., Dayton, Ohio, are out with a pocket catalogue of clay-working implements that is not only a very pretty specimen of art printing but will be found very convenient by brickmakers wanting anything in the line of supplies, as that firm are now manufacturing almost every thing of that character. Send for a copy.

WE ARE INDEBTED to Beverly K. Moore, secretary of the Boston Merchants,

Association, for a copy of the report of the eleventh annual meeting of that body.

A FEW ILLUSTRATIONS of elevating and conveying machinery, is the title of an attractive pamphlet just issued by the Link Belt Machinery Co., Chicago. The engravings are all by the "half-tone" or photo. process and show the various elevators and conveyors just as in actual use. They will be pleased to mail copy to any one interested.

THE WALLACE MANUFACTURING Co., on page 603 of this paper, announce that they are now prepared to furnish the Cunningham Automatic Cutting Table to the trade generally. This is an important and commendable move on their part. Heretofore they have restricted the use of this valuable device to those using their own make of machinery. This cutting table may be easily attached to any auger machine, and now those making brick by the stiff clay process can, if they choose, do away with the labor of cutting by hand, and do the work better and more economically by attaching this simple device to their machinery. For full particulars write the above firm at Frankfort, Ind.

NEW INVENTIONS.

The following is a lists of patents pertaining to brick, tile, terra-cotta, sewer pipe, pottery, etc., and the machinery used in their manufacture, issued since our last number.

- 472,590. Interlocking Block for Building, Paving, etc. Chas. E. Simpson, Portsmouth, O.
- 472,618. Re-Pressing Brick Machine. J. A. Frey and John Thompson, Bucyrus, O.
- 472,680. Roofing Tile. Levi H. Montross, Camden, N. J.
- 472,738. Brick Kiln Furnace. Wm. H. Martin, Covington, Ky.
- 472,922. Device for Conveying Bricks. Wm. Griffith, Pittston, Pa.
- 472,926. Continuous Brick Kiln. Wm. Johnson, Leeds, Eng.
- 473,301. Brick and Tile Cutting Machine. R. A. Drawdy, Jacksonville, Fla.
- 473,497. Pug Mill. Joseph Crossley, Trenton, N. J.
- 473,565. Brick and Tile Cutter. Wm. Broughton, Oberlin, O.
- 474,285. Brick. Cyrus Borgner, Philadelphia, Pa.

Mention the Clay-Worker,

When writing to Advertisers

Mention the Clay-Worker.

EDITORIAL NOTES and CLIPPINGS

LeMars, Ia., wants a brickyard.

Billings, Mont., is to have a brickyard.

D. W. Porter will make brick at North Troy, Vt.

Chas. H. Bryant will make brick at Oxford, Me.

A brick plant is to be erected at Pownal, Me.

Isaac Jensen will make brick at Brigham City, Utah.

Lemuel Clark will erect a brickyard at Millis, Mass.

Martin Maas will start a brickyard near Norwalk, O.

J. H. Fordice is making brick at Russellville, Ind.

Stratford, Iowa, wants a brick and tile factory established there.

Jas. A. Gray is enlarging his brick plant at Biddeford, Me.

Jas. Edington will operate a brick factory at Bridgeport, Mich.

A fine deposit of brick clay is said to have been located at Iron River, Wis.

R. B. Wilson, Wellington, Kan., will probably start a brickyard at Kingfisher.

An effort is being made to secure the establishment of brick works at Machias, N. Y.

Amos Whetstone and Harvey Slocum are going into the brick business at Dayton, Ia.

The New Plymouth Clay Co., New Plymouth, O., has been incorporated. Capital \$20,000.

Henry Wible and E. V. Crosby, of Greensburg, Pa., will build a brick plant near that place.

The Ridgeway (Ill.) Brick & Tile Co. has been incorporated by W. A. Peebles, M. K. Riley and others.

A large fire brick plant is to be established near Cleveland, Tenn. Boston capitalists are interested.

J. P. Norton has put in new machinery and otherwise improved his brick works at York Corners, Me.

The Leader Manufacturing Company, Decatur, Ill., is equipping a large paving brick plant at Danville, Ill.

Decatur, Ill., parties are building a brick and tile factory at Danville, which, it is said, will be the largest in the State.

E. M. Freese & Co., Galion, Ohio, are equipping the Lehigh (Ia.) Brick and Tile Co. with a complete outfit.

The Carlinville (Ill.) Brick & Tile Co. has been incorporated by Jos. B. Lister, Zack. Harris and John Lees. Capital, \$20,000.

The Corey Pressed Brick Co., Lehigh, Ia., has been incorporated by Silas, Frank, S. W. and H. A. Corey. Capital stock \$25,000.

The Fox River Brick Co., Toledo, O., has been incorporated by H. C. Ellis, E. B. Hall, John B. Fox, J. H. Lloyd and Thos. H. Tracy. Capital \$20,000.

Sam'l Collinge, of Easton, Pa., has been testing clay and shale at Brookville, Pa., where he will erect one of his four-mold dry-press brick machines.

The Bay City (Mich.) Brick & Tile Co.'s works are being overhauled. New machinery will be added and the capacity of the plant increased considerable.

A large brick manufacturing company is being organized at Canandaigua, N. Y. Extensive works will be built near that city. E. J. Burke, of Rochester, is interested.

Our good friend Thos. H. Flood one of Philadelphia's "big 4," has purchased a large tract of clay land on Nicetown-lane and will build a large machine brickyard thereon.

D. P. Guise, who is now making building brick at Williamsport, Pa., will build a new plant north of that city, for the manufacture of paving brick, having struck a rich vein of shale.

The Clay County Steam Brick Works, Green Cove Springs, Fla., are adding some new machinery, and expect to double their capacity. The brick business is very good in that section.

The Salem Mining & Manufacturing Co., Salem, O., has been incorporated by Joel Sharp, T. C. Boone, J. A. Ambler and others; capital, \$50,000. They will start a large brick plant in that vicinity.

Thos. Kitson, Judge S. S. Dreher, Dr. J. P. Mutchler and Milton Yetter, of East Stroudsburg, Pa., have organized the Saylorsburg Enamel & Buff Brick Co., and will build works at Saylorsburg.

Moses McCullough, aged seventeen years, employed in the factory of the Indiana Paving Brick Company, at Brazil, Ind., was fatally crushed in an elevator on the morning of May 5. He

was shouting to the workmen on the floor below, when he was caught by the descending elevator, and his head and chest were horrioly crushed.

H. W. Shepard, one of the founders of the Beatrice (Neb.) Sewer Pipe & Brick Factory, died at his home, April 29, from an over dose of muriatic acid, administered by mistake. Deceased was about 65 years of age.

Lemuel Yeager, an employe at the Marion (Ind.) Brick Works, while oiling machinery, got his foot caught between two heavy rollers and his leg was broken in a dozen places between the ankle and knee.

The Spokane (Wash.) Pressed Brick Co. has been organized, with \$200,000 capital, by A. J. Ross, Pres.; W. H. Wiscombe, Vice Pres.; H. A. Higbie, Sec'y & Treas. Works will be built and equipped with modern machinery.

There is trouble ahead for the brick-makers of Augusta, Ga., it is feared. W. J. Rutherford & Co., one of the leading firms, have withdrawn from the local association, and a contest is likely to ensue that will result in a cut in prices, and demoralize the business generally.

The Toronto, Ont., brickmakers are on a strike, owing to a disagreement with employers as to rate of wages. A reduction from last year's wages is proposed, which the men refuse to accede to. Nearly a thousand men are idle, and the building interests will probably suffer seriously as a consequence.

The three brick manufacturing companies, Brown, Clark & Co., Hobart, Sprague & Co. and John Klassen, of Grand Rapids, Mich., occupying adjacent yards, have pooled their fortunes, and hereafter will be operated by one corporation, known as the Grand Rapids Consolidated Brick & Tiling Company, capital \$150,000.

Many manufacturers are now arranging for various improvements in their works for the coming season. The putting in of new machinery of large capacity will leave them with small machines and appliances that are to all intents and purposes as good as new, which may be easily disposed of by a small "ad" in our "For Sale, Wanted, Etc.," columns.

The Fire & Paving Brick Manufacturers of Pennsylvania have formed an Interstate Association. At a meeting held in Rochester, Pa., recently the following

officers were elected: President, William Peeling, of New Brighton; First Vice President, William L. Dunn, of Pittsburg; Second Vice President, Milton Marquis, New Castle; Directors, J. P. Sherwood, New Brighton; — Gonnigle, Pittsburg; John Porter, New Cumberland; Archie Stewart, West Bridge water; Richard R. Hiel, Beaver.

Mr. F. W. Bennett, president of the Wellington (O.) Machine Co., favored us with a call recently. He was on a business trip, looking after the interests of the "New Quaker" and "Monarch" brick machines. The former, he says, is still in general demand, while the latter is gaining popular favor wherever introduced. Mr. Bennett's genial face is pictured on another page. Those of our readers who have not the pleasure of his personal acquaintance can readily understand why he is so popular, for he is as good as he is handsome.

Mr. J. G. Shea, of Decatur, Ill., looked in on us recently. Mr. Shea has been an ardent advocate of brick for paving streets and roadways for several years past, and is naturally much pleased by their general introduction and use. He says it's simply a question of good brick properly laid. Neither wood, stone nor asphalt can compete successfully with brick under these conditions. He is a firm believer in sand foundations and a double course of brick, and thinks that ultimately city engineers, as well as common people, will learn, in that best of all schools, experience, the advantages of that method compared with concrete foundations. It is not only cheaper, but better when properly done.

A Salt Lake City subscriber in renewing subscription writes: The outlook for the trade is good this season but the weather is against us for brick-making, as it is very wet, and the most of the brickmakers use soft mud machines and depend on the sun and wind to dry their brick. The Salt Lake Pressed Brick Co. are running a Chisholm Boyd & White dry press machine, and they are thinking seriously of setting up another one, as the one they have gives entire satisfaction. This firm turns out a brick which is made from a red shale that about equals the St. Louis red brick. Utah is striving to keep up with the procession of progressive brickmakers so you may expect to hear from us again.

C. & A. Potts & Co. report trade as being good, they having shipped eight

of their Horizontal Stock Brick Machine plants, with these was included Disintegrators, Mold Sanders, Engines and Boilers, Pulleys, Belting, Shafting, Trucks and Barrows, the past month. The demand for their Dinintegrators and Mold Sanders has surpassed that of any former year. They inform us that hey are now making all rolls used in the Disintegrator of the best grades of COLD BLAST iron, and that they are thoroughly CHILLED. We have no doubt from the great demand they have for these machines, but that Messrs C. & A. Potts & Co. are sparing no effort to furnish the best machine of the kind that money and labor can make.

INDIGNANT BRICK MANUFACTURERS.

Unable to Import French Canadians on Account of the Contract Labor Law.

There is much indignation expressed by Hudson River brick manufacturers over the action of the government in stopping the French Canadians from coming over the line to work on the brickyards under the Contract Labor Law. They say that it has been the custom for years for these men to work in the brickyards during the Summer, ever 1,000 of them being employed every year. They spend most of their wages here, and before going home to work in the woods in winter lay in their supplies. The effect is, the manufacturers say, to cripple the yards, and won't benefit the country for any their places are gradually being filled by Arabs from the Holy Land who will carry the money paid them out of the country.

A RAIN OF CLAY.

On April 4th. there was a shower of clay along the Union Pacific Railway at Onaga. The rain commenced early in the day, and soon the south and east sides of all houses were covered with yellow clay. The windows received such a coating as to shut out the sun's rays.

The Union Pacific train which ran through the storm had its windows covered, and the headlight was so completely plastered that the light was shut in and the train ran in darkness to Rossville, the next station, where the mud had to be scraped off.

This storm lasted until after daylight. As far east as Topeka, the windows showed that the edge of the mudstorm had extended this far. It was more severe about fifty miles northwest.

An excellent cut of the "Ajax" brick machine manufactured by the Ohio Machine Co., of Middleport, Ohio, is shown on page 586. The "Ajax" has some novel features and is said to be peculiarly adapted to the manufacture of paving brick.

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ANTHONY ITTNER,

MANUFACTURER OF

ST. LOUIS AND BELLEVILLE PRESSED AND ORNAMENTAL BRICK.

OFFICE ADDRESS:

ANTHONY ITTNER, Builders Exchange, Telephone Bldg., St. Louis, Mo.
St. Louis Works, California Avenue and Sidney Street. Belleville Works, L. & N. R. R. near Belleville, Ill.

Fine Press Brick, 10,000,000	Total Yearly Capacity:
Ornamental " 2,000,000	
Common Press " 15,000,000	
	27,000,000.

Our Press Brick have sharp and well defined angles, and are free from the objectionable mark or streak, so frequently seen running lengthwise through the face of the other dry clay brick, and commonly called "granulation."

The color of our brick being a beautiful dark cherry red, equal to any manufactured in this country.

The Dies we use are a Patent of our own devising, in which the liners can be renewed at a trifling cost, hence we have no occasion to let the liners become so badly worn as to mar the corners and edges of the brick.

We also have a PATENT REVOLVING UPRIGHT STEEL BRUSH PULVERIZER, which leaves the clay loose and flaky, a condition so favorable for making a solid uniform homogeneous brick, which, under the trowel, can be cut into any shape without breaking.

Ours is the only DRY CLAY Brick Works in the United States that harvests and gathers the clay in its depth, thus securing a standard, uniform brick, year in and year out, continuously.

The results of the above advantages are accounted for and seen in the following certificate, which speaks for itself:

MESSRS. ITTNER BROS., St. Louis, Mo.

BOSTON, Feb. 15, 1889.

GENTLEMEN:—We have carved the brick panel you sent us and ship same to you this day. Although we have had a large experience in brick carving, we do not hesitate to pronounce your brick the best for carving purposes that we ever used.

Yours truly,

EVANS & TOMBS.

We keep large quantities of Press Brick in stock, and are prepared to fill large orders on short notice. We pack them carefully in straw, so that they can be shipped long distances without material damage.

BOOKS FOR BRICKMAKERS.

It is pretty generally conceded that wonderful progress is being made in the ancient and heretofore unprogressive art of brickmaking. Among the best evidences of this is the fact that the brick-making craft is no longer without a literature of its own. There are now some good practical books treating on the manipulation of clay—the making, drying and burning of brick. The list is not so large but that every brickmaker can afford to have them all. Get them and read them.

"BRICKMAKER'S MANUAL,"

Morrison and Reep, \$3.00

"BRICKMAKING AND BURNING,"

J. W. Crary, Sr., 2.50

"TABLE OF ANALYSES OF CLAYS,"

Alfred Crossley, 1.00

"DURABILITY OF BRICK PAVEMENTS,"

Prof. I. O. Baker, .25

Mailed, postage free, on receipt of price. All of them to one address for \$5.50. Address the publishers, T. A. RANDALL & Co., Indianapolis, Ind.

THE CLAYWORKER.

THE OFFICIAL ORGAN OF THE NATIONAL BRICK MANUFACTURERS' ASSOCIATION OF THE UNITED STATES OF AMERICA.

VOL. XVII.

INDIANAPOLIS, IND., JUNE, 1892.

No. 6



A FRENCH CHATEAU.

Written for the Clay-Worker.

A SPECIMEN OF FRENCH BRICK AND STONE ARCHITECTURE.



THE PART OF the Chateau of Blois, shown on the preceding page, was built under Louis XII. It is interesting to brickmakers, because it shows how brick and stone were handled at that time. It is also interesting to clayworkers in that it shows an architecture which is better adapted to brick and terra cotta than to brick and stone. The stone which is used in this building is a soft material which has no great tensile strength. For that reason it is used in small places; places which, in size, could be readily burned in terra cotta. Now, we all know that terra cotta has the tensile strength, but that owing to the difficulty in burning very long lintels, large pieces are not easily produced. However, we may see from the construction of the French brick and stone work how the stone forms may be naturally and properly adapted to uses in terra cotta. These people are compelled, for the most part, to use small bits of stone because of the stone itself, and we in America, in using terra cotta, are limited as to size because of the difficulty in burning. Now we have the same general result, and by viewing the means adapted in using the small structural parts, we may see how the terra cotta may be adapted into the variety of forms, beauty and elegance of design, which belongs to and is a part of the French architecture. This is certainly a very worthy object lesson.

In considering any building which is immediately before us, there is always a temptation to make comparisons. In looking at this photograph of a fragment of the Chateau of Blois, there is a temptation to ask, "How does it compare with the other chateaus of France?" We can best say, first, that its structure is entrancingly beautiful; workmanship is nearly perfect; the design is exquisite and the conception grand. Nothing is lacking in the general idea, or its fulfillment in detail, to make a marvelously beautiful structure. Yet there are chateaus and chateaus. The Chateau Blois has its own particular beauty. It is under a somewhat different scheme; different idea from the others. We may take others and say for them all that we say for this one. Yet there is no real basis for comparison, maybe because there is a difference in style;

difference in material; difference in time in which they were built, and while they fulfill the special requirements and demands for the place which they occupy, there is little basis for comparison. The traveler who goes through the valley of the Loire, which is the great chateau country of France, makes himself and his friends a great deal of trouble by attempting to decide which is the most beautiful of the chateaus. It is interesting to know that they are all beautiful, that they have all been built by artists, and that there is not a homely detail or a crude idea in any of them. It shows that, with proper education in matters artistic, mistakes are well nigh impossible.

- It is interesting to notice the diagonal patterns in the wall surface of this brick work. It may require close observation to get hold of it from the print; the marking is not very distinct even in the building. There is a slight difference in the color of the brick, and altogether the effect is quite satisfactory. In this building it has a definite relation to the details of the decoration. We can see that the carving is quite rich and quite elaborate. Now, if all the wall surfaces are absolutely plain, the decorative work would stand out too distinctly and by itself; there would not be the unity which is necessary to a positively successful design. By disturbing the surface of the brick work, all these light diagonal patterns, the richness in the decoration, and what would otherwise be the plainness of the wall surface, are brought together and united in a successful whole. Thus, while the building is profuse in decoration, it has no appearance of overloading; nor is it in the least tiresome to look at. Everything holds together well, and there is a consistency which brings one more and more in sympathy with its beauty.

It may be interesting to know that the original color of this stone work was a creamy white, the brick not a very bright red. The figure over the doorway is in bronze, backed up with a strong ultra-marine blue, on which are figures in gold of the Fleur de Leis.

It is interesting again to notice that in front of this building is a clean street; a thing common, too, in nearly all of the Continental cities, and a thing uncommon in all of our American cities.

Fire clay in Scotland is frequently as deep as 1,000 feet beneath the surface.

GONE WITH THE PINS.

Where is the thrill of last night's fear?
Where is the stain of last week's tear?
Where is the tooth that ached last year?
Gone where the lost pins go to;
For last night's riddle is all made plain,
The sunshine laughs at the long-past pain.
And the tooth that ached hath lost its pain—
That's what our troubles grow to.

Where are the clothes that we used to wear?
Where are the burdens we used to bear?
Where is the bald-head's curling hair?
Gone where the pins disappear to;
For the style has changed and the clothes are new.
The skies are wearing a brighter blue,
The hair doesn't snarl as it used to do,
And the parting has grown more clear, too.

Where are the bills that our peace distressed?
Where is the pin that the baby "blessed?"
Where are the doves in last year's nest?
Where have the pins all gone to?
On the old bills paid and the new ones thrown,
The baby's at school with her pins outgrown,
And the squabs are running a nest of their own—
You can't bring 'em back if you want to.

We can stand the smarts of yesterday,
To-day's worse ills we can drive away;
What's was and is brings no dismay
For past and present sorrow;
But the burdens that make us groan and sweat,
The troubles that make us fume and fret,
Are the things that haven't happened yet—
The pins that we'll find to-morrow.
[Robert J. Burdette, in Ladies Home Journal.]

CARE OF FINE CHINA.

One of the troubles of a housekeeper's life is the practice that some servants persist in, of pouring hot water over fine china. I went into the kitchen one day just in time to see this done, and when I spoke to the maid about it, she immediately turned about and deluged the ditches with cold water from the hydrant. It seems impossible to impress on the minds of these people the fact that sudden changes of temperature will crack the glazing on almost any earthenware, and that it is practical ruin to fine grades of china; and all argument on the subject seems wasted. They will take the dishes out of the pan, examine them with greatest care, and declare they are not injured a particle, and they may not show, at the moment, that they are, but soon afterwards they begin to "craze," as the manufacturers say, and, after a time, are covered with tiny lines of crackle. There is but one safe way to wash China and glassware, and that is to have the water of just sufficient temperature so that the hands can be put in it. Water that is too hot for the hands is too hot for good dishes. I used to insist on the servants preparing the dish-water before putting the dishes in the pan. To do this, they must rub the soap on the cloth, and will easily discover what the proper degree of heat should be. In this same con-

nection I may say that I never allow dish-mops in my kitchen. Servants are absolutely certain to use boiling water because they do not realize the necessity for cooling it when they use a mop. If the pieces are brushed out with a mop the water may be actually at the boiling point, and for this reason I think that the dish-mop should be banished from every well-regulated kitchen.—*N. Y. Ledger.*

A REPRESENTATIVE CLAYWORKER.

THE accompanying sketch presents the well known face of Horace B. Newton, one of the brightest and best posted men in the fire brick industry. He is now president of the National Association of Fire Brick Manufacturers and the chief officer of the old established firm of Newton & Co., of Albany, N. Y.

Mr. Newton was born in the city of Albany, N. Y., about fifty-five years ago, and has always resided there. When very young he became identified with the fire brick industry. There was located in Albany at that time a small pottery and fire brick works which were operated by Jacob Henry. Here it was that Mr. Newton learned the rudiments of the business and finally became a member of the concern. At the time of his admission to partnership in 1852 the business was small and circumscribed. Through the able management of its chief officer the business has been brought to its present amplitude, extending, as it does, throughout the United States and Canada.

There is scarcely a stove manufacturer in the United States or Canada who is not personally acquainted with Mr. Newton. If they do not know him, they surely know of the celebrated "Iron Stone" stove linings which are under his direction. Mr. Newton is a man of the most pleasing presence, and his manner is invariably cordial and courteous to all with whom he is brought in contact. He enjoys a wide popularity among the iron and stove trades, and he has also won the respect and confidence of his own craft. Hundreds of fire brick men from all sections of the United States have shown their appreciation of his sterling qualities by electing him for several successive terms

to the presidency of their National Association. He is considered a thorough master of the details of fire brick manufacture, and is looked upon as one of the best posted men in his line in the United States.

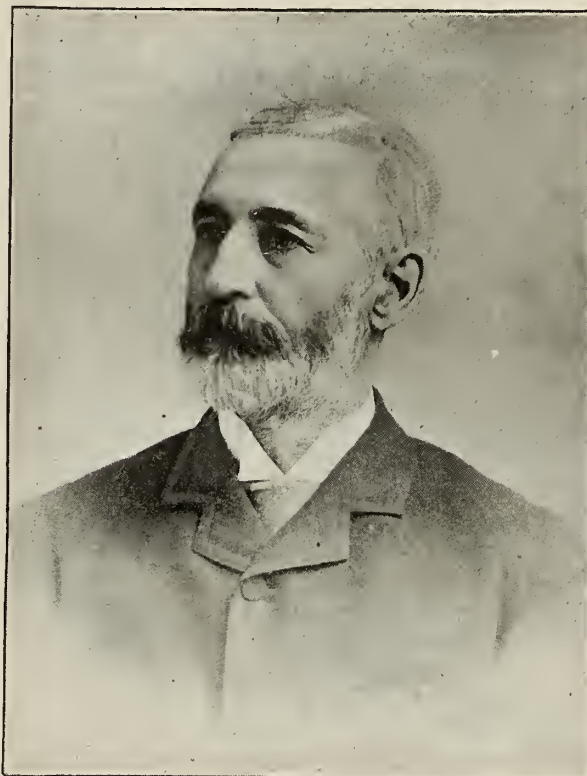
Written for the Clay-Worker.

PRACTICAL POINTS ABOUT PAVING BRICK.

Second Paper.

THE CLAY.

VARIOUS opinions have been expressed, and much free advice given upon the subject of the selection of proper clays for the man-



HORACE B. NEWTON, PRESIDENT NATIONAL ASSOCIATION OF FIRE BRICK MANUFACTURERS, ALBANY, N. Y.

ufacture of paving brick. Some of the statements made both in the discussions at conventions and in articles published in periodicals devoted to the clayworking interests have the appearance or at least suggest that individual interests are being advanced.

Many clayworkers of to-day in the Western States have vivid recollections of the effort made ten or twelve years ago by a few manufacturers of drain tile to establish the idea that good tile could not be made of common clays, but that the proper thing was to use fire clay tile. These manufacturers were working a clay that did not burn red, and they hoped to prejudice

the public mind against red tile.

They soon found that they had shouldered more than they could carry, as excellent tile were being made of common clays that burned red. The manufacturers of red tile retaliated by showing that fire clay was not at all adapted to the manufacture of drain tile. Because of its essential characteristics it contained no fusible ingredients and hence would not assume, under the heat of the kiln, the conditions necessary to the successful resistance of the disintegrating influences of moisture and frost.

The advocates of fire clay changed their tactics and advocated potter's clay tile, but by this time the red tile had been given a fair trial and had been received into the good graces of the farmers.

The paving brick interests are passing through a similar experience with the difference that, in some localities the paving brick made of common clays were first used and grandly stood the tests for years, notably at Bloomington, Illinois, and these same brick demonstrated to the satisfaction of all concerned that pavements made of brick were to be the pavements of the future.

Within the last few years there has arisen a great hue and cry about vitrified paving brick, but this subject will be taken up later.

The effort has been made by manufacturers in a few localities to disseminate the idea that paving brick should be made after their kind, or made of clays such as they are working, and that their kind of brick are superior to all others.

Custom has made this practice admissible as an advertising scheme, and maybe their brick are superior, but the stern fact stands prominently before the minds of those who have been careful readers of the CLAY-WORKER and of those who have taken the pains to investigate the matter that good and acceptable paving brick are being made from a great variety of clays. These clays are so very different that no one can consistently say that this or that kind should be used to the exclusion of those that differ materially from it in color or mechanical condition. Another

stern fact which relates to the color of clays used is, that some manufacturers are successfully using yellow, others red, blue, gray, white and light steel gray.

A third stern fact is, that clays differing widely in their mechanical condition are being utilized in the manufacture of good paving brick.

At Moberly, Mo., they work a clay that is almost as hard as stone and which must be blasted from the bank. At Decatur, Ill., the clay used is a common yellow joint clay and is spaded directly from the bank. At Des Moines, Ia., a layer of soapstone is mixed and ground up with the clay.

In Galesburg, Ill., a shale or marl is used. Some of the clays are found on the surface of the earth while others are mined a hundred feet deep.

These facts lead inevitably to the conclusion that the seeker for a clay from which to manufacture paving brick need accept or reject none because of their color, mechanical condition or position with reference to the surface of the earth.

An eminent authority, who has had a wide knowledge of clays in many States of the Union and who has made a special study of brick pavements and paving brick, Mr. J. J. W. Billingsley, the editor of the *Drainage Journal*, expressed his opinion upon this subject as follows "I am confident that clays suited to the manufacture of paving brick are not the exception. I believe that common clays could be manufactured into pavers with proper management."

This matter of the management of the clay embraces several distinct processes which may be classed under the following heads:

- Preparation of the clay,
- Moulding it into the brick,
- Drying and burning.

A few general thoughts upon each of these will be given. In order to succeed each of these processes must be varied and adapted to each particular clay and experience teaches that no definite rules can be given for all.

PREPARATION OF THE CLAY.

In the preparation of the various clays in use, the methods employed by different manufactures are as varied as the clays to be prepared.

One clay is pit-soaked one day, passed through smooth roll crushers and then carried by an elevator directly to the brick machine.

Another will not take water until it

has been exposed to the air for some time. A third is passed through rollers where it is ground fine, then screened and pugged. A fourth is ground in a dry pan, screened, pugged through two mills and then pugged and molded by stiff clay machine and the brick are then repressed.

Thus we learn that some clays will make good paving brick with comparatively simple processes of manufacture while others pass through more elaborate and expensive modes of treatment.

The fact stated above that the clay must contain some ingredients that will resist the action of the heat in the kilns, and by so doing preserve the form of the brick and others that will fuse and unite all particles into a dense, solid and, as nearly as possible, an impervious mass, suggests the advisability, in some cases of mixing different clays and thus obtaining the necessary combination of fusible and non-fusible ingredients. Here also may be found a reason why fire clays and a great many beds of nearly pure or simple clays will not make good paving brick, and why so many beds of so called common clays, which are always of a complex composition, are so admirably adapted to this use. It is not only necessary that the clay that enters into the composition of a paving brick should contain the two classes of materials just named, but it is very essential that these should be finely divided and thoroughly mixed.

Two of the essentials of a good paving brick are that it shall be homogeneous and impervious to water. These conditions can only obtain from a mixture of different clays by thoroughly incorporating the ingredients so that each constituent particle of clay in the brick may contain a proper share of the elements that resist heat and thus tend to preserve the form, and those that melt and unite the particles together into a homogenous and impervious whole.

This condition can only be obtained from a mixture of various clays by a thorough process of grinding and pugging. These operations not only reduce the clays to a finely divided condition but thoroughly and uniformly mingle the finely comminuted particles, and thus place them in the condition necessary for the amalgamation that is to occur through the mechanical and chemical changes that are brought about by the heat in the kiln. Too much stress cannot be placed upon the

necessity of thorough preparation of the clay.

Those manufacturers who are making good and satisfactory paving brick with little labor in grinding and pugging are fortunate in possessing a clay in which the work of finely dividing and uniformly associating the ingredients has been done by nature during the processes of arranging and depositing their particular beds of clay.

Unfortunately all are not so favorably situated, and success can only be attained by faithful attention to this work where nature has left it undone.

In the decision of the methods to be employed and the selection of the proper machines and appliances for the work, the judgement of the manager must be exercised and, in many cases, his success or failure will depend upon the wisdom of his decisions.

While it is very essential that the clay should be well prepared, "enough is as good as a feast" in this as in every thing else, and all that is required is that enough work be put upon the clay to make a brick that is good enough. After this has been done any work becomes a useless expense and a source of loss to the proprietor.

(TO BE CONTINUED.)

Written for the Clay-Worker.

HINTS ON BRICKMAKING.

No. 64.

BY R. BRICK.

SETTING AND BURNING A KILN WITH TEMPORARY CASING.

FIRST prepare the ground or kiln seat by making perfectly level both ways. The kiln should be about 24 feet in width, the walls at the ground 16 inches, so the ground should be leveled a width of 28 feet. Around this cut an open ditch eight inches below kiln seat, and eighteen inches wide, sloping from eight inches in center to kiln level at sides. This must be carefully done; also a larger ditch to receive all the water from both sides of the kiln and carry it to some outlet. In setting the kiln we would recommend benches set three and one-third bricks in a bench, with eyes twelve inches wide for coal burning, or fourteen inches wide for wood burning. The manner of setting benches has been illustrated and described in two separate editions of the CLAY-WORKER, and need not be described here. It is also to be found in "The Brickmakers Manual." In setting a temporary kiln it cannot be carried up plumb on the out-

sides as is the case with one set in permanent walls. It must slope inward or "batter" from ground to the top at least twelve inches. Your kiln is 24 feet wide at the bottom and only 22 feet or less at the top. Ends are set in like manner. In setting benches it is necessary to set headers on the outside; not only one length of headers, but some courses should have two lengths, and these two tied together by next course. This must be continued to the top to prevent the kiln from falling outward when settling, as sometimes happens. The outside should be set smooth, so the casing will lay firm against it. The two outside lengths of brick should be set with more space than the balance of the kiln. If the kiln is set six over two lengths the outside should be set only five over two lengths. If it is possible a flat course of burned brick should be used on the ground to set the green brick on, also as a foundation for casing walls, or, as it is called in many places, "scoring." Burned bricks for platting are also vastly better than unburned, as they protect the top from leaks, do not shrink when kiln becomes hot, and enables the burner to walk over the top while water smoking without injuring the unburned bricks.

Where there can be no burned brick secured unburned must answer for the first burn.

Benches should be about nine courses high, and for a twelve-inch flue four overhanging, or "jet," courses; and for a fourteen inch flue five overhanging courses. For an outside kiln about 36 courses is high enough. For wood burning make a single fire opening for each arch of the kiln twelve inches wide and twelve inches high on the sides, then arched with four inches rise, making opening sixteen inches high in center. Begin casing sixteen inches thick and carry it up above fire opening, then drop off four inches and carry it up twelve inches half way to top, then drop off four inches and carry up eight inch wall until within two feet of top, then

four inches to the top. In burning these kilns it is necessary to prop or brace these walls with timbers set in the ground and leaning against the wall where it bulges.

In making arches for coal burning make an arch as described above, only a course lower. Then above this make another fire opening eight inches wide and three courses high on the sides, and covered with an arch two inches rise. When water smoking fire with wood in lower fire hole. If you wish to drive heat to center while water smoking leave



JONATHAN CREAGER, INVENTOR GRAND AUTOMATIC BRICK MACHINE,
CINCINNATI, OHIO.

upper arch or fire hole wholly or partly open. If you wish more heat on the wall close it up by setting two bricks against it. As soon as the bricks are dry and ready for coal, fill up lower arches with wood and fire with coal through top opening. The four-inch offset in wall at the bottom of this hole forms a hearth, so that the hole is closed with lumps and fine coal. Fire then only above with coal. When the arch fills up take out ashes and clinkers through lower opening; also supply air for draft and combustion in same manner. In drying off the kiln fire slowly

and only mouth fires first twenty-four hours, then increase heat and push wood back until at the end of forty-eight hours the fires meet in the middle only one stick to each length of wood. After that fire stronger until ready for coal. The arches can be cherry red by the time kiln is dry. Then put on coal if coal is to be used, or if wood increase firing until the arches are red through and keep increasing heat until the arches show signs of settling. If then the fire is well through the top begin the settle. The middle should move first and sides soon after. This prevents kiln from opening on top, as it will settle together. I would then fire the whole way across and heads to try to settle the whole top at once, and if possible finish the kiln firing from both sides all the time. If, however, the fires cannot be controlled and incline to go too much to center, then close and daub up one side and fire from the other until that head is down, then reverse fires and close opposite side and settle it, but would not change more than once, as the change in degree of heat injures the arch brick. In firing have fuel all ready before beginning, so that the fire is made in the least possible time, admitting as little cold air as possible. Keep the top of the kiln tight while settling. This is essential to success. Plaster up promptly all openings that appear on the walls while burning. Amount of heat

required and depth of settle must be learned from experience with the clay used.

ODD, BUT SEASONABLE.

Little boy,
Parents' joy,
Took the colic—
Paregoric
Doctors came
Without number,
Boy died game—
Cucumber.

There is nothing so necessary as necessity; without it, mankind would have ceased to exist ages ago.

Written for the Clay-Worker.

WRITING, WRITERS, AND PROPER
SUBJECTS TO BE PRESENTED
AND DISCUSSED IN
CLAY-WORKER.

BY J. W. CRARY, SR.

THE great difficulty in writing for a public Journal is, to have something to say, and then say it so that the reader will be impressed and benefited. Talking against time, and writing against space, is a poor business. Rhetoric eloquence and diffusion do not furnish food for the mind or funds for the treasury. I take the *Congressional Record*, and when I come to the valuable Chafly, Buncombe speeches, made and printed for the "Dear people," I just read them by paraphrasis; and if I happen to find a new idea, or a fresh "Chestnut" I put it in my memory box with the author's name. But it makes me sorry for "Uncle Sam," that he has to pay for so many *shucks* and get so little corn.

I by no means excuse myself as to "Short Corn." I, no doubt, often throw in "Nubins," for big ears of corn; but like Congressmen, and Preachers, I try to give good measure. The common mistake of most writers and speakers is, to write and talk for their own ears, instead of the ears of others. It is an easy matter for a man to get rid of everything he has, or can get in the World, except himself. If we could only look at ourselves, with other peoples eyes, a little real good brains would make even a dull pen look a little sharp.

THE PROPER THINGS TO WRITE ABOUT IN
THE CLAY-WORKER.

The CLAY-WORKER, if I understand the object and purpose of the Journal, is to present and discuss every matter directly and incidentally connected with clay, or the use and effect of it. This covers a vast field in the economy of civilized life. Indeed, there is scarcely a human want, necessity or comfort that does not directly or remotely refer to the use of clay. Intrinsically, clay is the most valuable and indispensable of all other minerals on the earth. Its value and uses are more studied and understood now than at any former period of the world, and as it has been truly said: "We are entering a clay age." Science teaches, and experience demonstrates that whatever tends to physical health and comfort, improves moral and mental condition, and without specifying, no one of good sense and

intelligence will deny that clay, in many forms, must be extensively used in the construction and keeping of the very best modern dwellings, and also in the improvement of streets and roadways, and public buildings of all kinds.

Each writer for the *Clay-Worker* should study the clay question in all its bearings, and if he can deal with any one department as a specialty, he should give his best talent and work to that, so that those who take and read the CLAY-WORKER will have the benefit of concentrated, reliable thought on that one department of clay work. I do not object to versatility. If one man can ramble about, all over clay, so that he cannot even court for a wife, or talk politics without "dilatatory motions," to consider clay, provided he is a true expert, I have no objection to his diversions.

I may perhaps, get out of the channel of my own proper thoughts sometimes, when trying to write for the CLAY-WORKER, but I have traveled so many clay roads that I am not much afraid of being lost.

I do not want to be personal or invidious, but I must say that Brother Morrison appears to be the veteran writer of the CLAY-WORKER. He not only makes first-class time running on "*brick*," but he has everlasting good bottom. A man that can write sixty-three articles on the dry old subject of brick, with entertaining and approved ability, is a "*Brick*" the whole craft should be proud of.

I must be a little more personal and invidious, without any intended slight to the score, and over, of the excellent contributors to the reading columns of the CLAY-WORKER, and say that our very able scientific friend, Wm. Waplington has not only given us highly instructive and beneficial articles in disguise on *combustion*, but has now thrown off his mask and commenced a series of articles on "Chemistry for Clayworkers." I don't know that Mr. Waplington is a brickmaker or clayworker of any kind, but I do know that his head is chuck full of science, which he deals out in a way so plain and attractive that it is impossible to ignore it or read it without great benefit, especially to the clay craft. I hope all young men, who desire to have an intelligent understanding of the clay art, in any department, will be sure to take and read the CLAY-WORKER. It is a shame to common clayworkers of all kinds, and especially brickmakers, that

very few of them know anything about their trade, except the mechanical labor part of it. I would say that a regular study of the CLAY-WORKER, and the books it has for sale on clay work, for one year, (with practice in a clayworking factory,) will make a better and more reliable expert of such student than can be found amongst the old gray headed ignoramuses, who call themselves experts and masters of the trade.

It is the proprietors of clay works that are at fault.

This is apparent in most places. These "penny wise, pound foolish," persons, think that it only requires fuel and sweat to burn brick, and only a common laborer to set a kiln. The result is, as an average, at least one third imperfect output of brick, which goes at no more than cost price. Now, look at your foolishness; you have a kiln that holds 300,000 brick, you get botches to set and burn it, you have lost the handling of 100,000 brick, and not made a cent of profit only on the 200,000 you could sell. Suppose that profit is \$500 you have lost at least \$250 on the salmon and imperfectly burned brick, besides loss in reputation. Now, suppose you had employed a first rate expert, to direct and have your kiln well set and burned, and that you make 3,000,000 per year, you save at least \$5000. Now give one-half of this to a reliable expert brickmaker, that will guarantee first-class work, and you still save \$2,500, and build up a reputation, worth more to you in the long run than the cost of a No. 1 superintendent. I address myself to the common average *Brick Works Company*, and I know just what I am talking about. I have been all around and through your style of works. You go to work at the wrong end of the line. You get a clay bed, a brick machine, etc. etc., and then put a sort of "red tape" second cousin, (who has visited a few brick yards and talked brick with the bosses,) to take charge of your works you pay him and the president and secretary enough to hire and pay a first-class brick setter, burner and manager of all the practical part of the plant. The consequence is, a succession of failures and troubles; and all just because you do not properly value and pay a brainy, reliable, expert superintendent.

Gentlemen, with a "Brick in the hat," I would advise you to get a good, well bred Doctor before you take medicine. Don't nearly kill yourself with patent

stuff, then call a Doctor. Learn to respect and appreciate an accomplished brickmaker.

Written for the Clay-Worker.

BETTER ROADS--HOW TO SECURE THEM.

"An 'Highway' Shall be There."—Bible.

WHEN the ubiquitous Yankee Nation undertakes to do anything, it is usually a job big enough to attract the attention of the whole civilized world; while the nation around and about us, or related to us, stand by with uplifted brows, and mouth agape. At present we are in a position to draw on Europe "Sight draft," to construct our country roads. Why not make use of the opportunity?

Within the past few months there has been aroused great interest in our country roads; also in devising ways and means for their betterment.

The first and most important matter relating to them, are the laws in regard to taxation, and proper assessment of cost. The laws regulating their construction and management are not nearly so difficult to adjust.

That our road laws need re-adjusting to suit our changed conditions need not be argued. The present condition of our country roads and highways, is an urgent appeal for good road laws and their proper enforcement. When the Society for Prevention of Cruelty to Animals, in a thickly settled section of the Great and Wealthy State of Ohio, compels the oil companies to remove eight strong horses from one common road wagon, loaded with oil pipe, it is time for the people to clamor loudly for better road laws. The country roads in Ohio are no worse than any of the other States. We only cite this as an instance.

Throughout the country, there is usually from three to four months during the fall and early spring, when the roads are, strictly speaking, impassable. If the winter should happen to be a mild one, as is sometimes the case, the whole five or six months are virtually lost to the farmers who have crops or produce to move to market. The roads are a billowy sea of mud; a veritable "slough of despond." Even stock cannot be driven to market over roads with the mud knee deep. The writer has frequently seen fat hogs

flounder helplessly on the muddy, bottomless roads west of the Mississippi. Mules fast in the middle of the road, all four feet sunk deep in a quagmire, and were hauled out with ropes, assisted with a fence-rail as a lever.

This too in a State where the road laws can compel all able-bodied men to perform from five to thirty days labor annually on the public roads; where there are mountains of crushed flint, limestone and other hard rock ready and at hand prepared by nature, that have only to be shoveled up and hauled onto the roads.

When the question was asked why it was not spread upon the roadway, the



C. McDERMOTT, SEC'Y THE WELLINGTON (O.) MACHINE CO

answer would be that the flint was "awful hard on wagon tires."

We think such roads are "awful hard" on morals, and man's finer sensibilities and destructive of souls and bodies as well. The older States of the Union, under the present laws, squander enough of the road taxes and labor annually, to build from five hundred to fifteen hundred miles of good, honest, substantial brick or stone roadway in each of the States. See Gov. Hovey's address to the people of Indiana for 1891 on the road question.

We pick up any of the newspapers or standard publications, and we read long and learned discussions on tariff and

free trade; and the burdens of taxation becomes a night-mare to us. We stand halting and trembling between the two, not knowing which way to turn because of the ills in either case. Taxation that is obscure, hidden, microscopic is howled about by demagogues, and the people sit down and weep over imaginary ills, and will not be comforted. They feel themselves to be between the devil and the deep sea. They'll be damned if they do, and they'll be damned if they don't.

The farmers of this country to-day submit to taxation for highways, both direct and indirect; that is plainly and palpably unreasonable, unjust, and burdensome. Submit to it too without a word in question with a devotion that is shameful, because it is not lovely.

The farmer class to-day tinkering with finances, and *experimenting with monopolies*, is suggestive of a bull in a China shop. If the farmer will turn his attention to the matters that more nearly concern him, and which he thoroughly understands, and read up on his old obsolete, defunct road laws; then set himself to work to devise a better system governing taxation for their construction and maintenance, he will confer a more lasting benefit on himself and mankind at large; and his children and children's children will rise up and call him blessed. We will command the aid and assistance of the brickmaking fraternity to second every laudable effort in that direction.

The laboring classes are in a disturbed condition (and very properly too,) regarding the convict labor question, foreign emigration, and our alien laws. The present Congress has passed the Chinese exclusion bill and it has become a law.

Now ask Congress to pass a law which would compel every foreigner, seeking a home and citizenship among us, to serve his five years of probation as a laborer on our public roads and highways; or pay a cash equivalent in lieu of his labor. There need be no hardship in this method, and a much shorter term of service than we who were born here had to serve. We had to reside here twenty-one years to acquire citizenship. They who come to our shores scarcely acquire it in Europe, in most parts of the country, in a residence of a whole lifetime. The greater number

bricks and tiles are placed in the kiln. This is some 15 feet deep by about 9 feet square. Beneath this is the furnace, say 6 feet high, and communicating

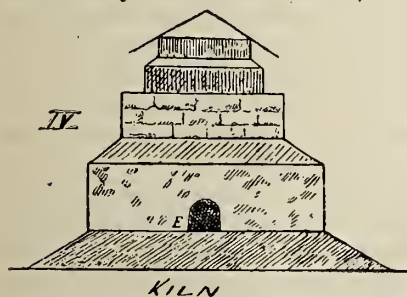


with the upper part by long holes in the floor. In the large kilns there are two arches to the furnace, and a division in the middle; in the smaller kiln one arch only. For fuel, wood, shavings, faggots, etc., are used—coal not being generally employed in this part of France. The furnaces are kept going 48 hours, being limed up, and the top of the oven covered with tiles. Fifteen days are then allowed for the bricks, etc., to cool. They are then ready for use. The common bricks for outside solid work are made by hand in a mold.

Of these a man will make 2,800 to 3,000 per day. The clay is of a much lighter color than stiff British clay, and produces very good work. Before the finer bricks are burnt they take a good color with drying.



This yard, of course, is only small, but from it some idea may be got as to how the supply is kept up in country places. One thing was striking about the place—the substantial nature of all the buildings, a very great contrast to a small brickyard at home. This, how-



ever, is noticeable in most small erections in Southern France, and it is to be hoped it may long continue, as it is only this that can give a stimulus to good brick and tilemaking.

Illustration IV. shows the form of kiln in use, the furnace being under-

neath, and the bricks burnt in the upper part. The furnace is very strongly constructed and well finished, the wall presenting the appearance of a smooth slab. The opening E is securely limed up while burning.—*The British Clay-Worker.*

Written for the Clay-Worker.

BRICK FOR STREETS AND COUNTRY ROADS.

SINCE the advent of vitrified brick for paving cities' streets and thoroughfares, like all other discoveries, the original projectors have been subject to no end of scoffing and ridicule. There has been a general awakening everywhere, not only in America but in foreign countries regarding the use of this material, not only for use on the streets of cities where subjected to heavy traffic, but for country roads, and the time is not far distant when the present rutty, uneven, and muddy roads will be superseded by vitrified brick, at which time, which present Historians foretell, not only will country properties be enhanced in value, but city denizens will be enabled to live cheaper from the fact that the cost of delivering what we eat, drink and wear will be lessened fifty per cent. at least.

The latter proportion may strike some of my readers as an idle theoretic vagary, but its efficacy and pertinence may be proven by facts and figures, all may understand. For instance, the writer is, I do not know whether fortunate or unfortunate—the possessor of a bit of land, four miles from a railroad, and, like the majority of Indiana's roads, the highway leading from the station to the little inland town is not the best that can be made, though fully up to the average of country roads, perhaps. The cost of hauling supplies, and delivering farm products over this four miles of road, I know as well as anyone, having paid the bills for ten years or more. Last July I bought some supplies, fertilizers, in Boston, Mass., they were received at the factories, hauled five miles over Boston's streets, shipped by rail to Indiana, and the bill for hauling from the depot to the farm, was within fifty cents of what it cost me for delivering at Boston and freight charges together, and, the worst feature of all is, the man who did the country hauling has hard work to make a living and pay his bills, for, what with lame and otherwise used up horses, broken wag-

ons, etc., his business is no bonanza by a big majority.

Again, in marketing produce, we invariably haul our wheat and other products seventeen miles in another direction, over a toll road, in preference to the four miles of free pike. While the former is very hilly, the latter a level country, the difference in the road itself being the reason for the long route in preference to the short one. Now, the city of Madison, not in the midst of a productive country, to a much greater extent than many others, but is justly celebrated far and wide as the cheapest place of residence hereabouts, not because of the adjacency of farm lands, but simply by virtue of the fact, that there is a good road leading to where the produce is raised in plenty; as a result, people and business gravitate to a very undesirable location, in many respects, without any effort on the part of the city proper.

The fact of the business is, both city, town, country and state authorities are sleeping in a sort of political lethargy and seem to be afraid to urge the adoption of better streets and thoroughfares, or else they wait the settlement of country places to create a demand for the latter, and increased traffic to demand the former. All such reasonings are both jejune and impertinent. Public thoroughfares, roads and railways make a country, and not *vice versa* by any means. When we prepare means of communication people will get there, but they will not, cannot go before the ways are open, "and the rough places hewn down." It is plain, therefore, when Commercial Clubs and the like seek to induce the country to build better roads they should try, as most of them do, to impress upon the Granger's mind that he and his neighbors are to receive the greater benefits, but the cities' interests, which such organizations are supposed to represent, are to be benefited to a greater extent, and I have facts and figures to show that, if the same amount of money now donated as bonuses to factories and like enterprises, to add to a city's population, tax-payers and prosperity was spent in pushing out in various directions, country roads, and paving with vitrified brick, they would obtain the objects sought at less than one quarter of the expense.

The above may seem a sweeping assertion, but no firmer is my faith in the eventual reconciliation of Pike and Eudaly, than is my belief that if cities

would erect vitrified brick plants, or encourage individuals to do so, and, in addition to their local demand for new streets, say to the people in the country, we will furnish the pavers at actual cost, the country roads, especially along the more thickly settled, would soon be all paved and kept in repair, at less cost in dollars and cents, than with the present system of building and repairs.

Many people have been led to believe that to make vitrified brick requires a rare and valuable material, only to be found in a few isolated sections of the country, and while I am not disposed to censure these men with money and brains who have ventured out in this comparatively new industry, to impress on the minds of prospective consumers the rarity, scarcity and consequent value of their respective wares, nevertheless from the standpoint of the chemist, whom, thousands of you know, I have no hesitancy in saying that the materials suitable for the manufacture of vitrified brick are among the most abundant of any of nature's products; though, of course, they vary in quality and are not always found in the same layer and deposit, but that there is plenty to supply the demands of the country for thousands of years to come there is no question, and I speak from the books. If the material is not just where wanted do like Mahomet,—but go to the clay instead of the mountain. J. F. E.

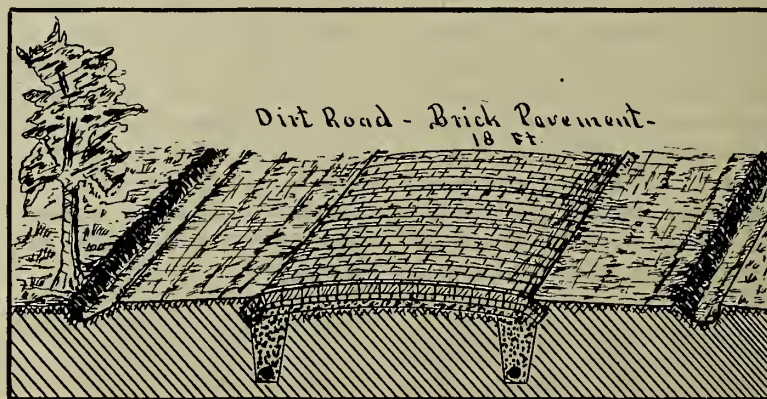
PAVED AND DIRT ROADS COMBINED.

DURING the Summer of 1891, the project of constructing a permanent road between the city of Bloomington and the town Normal, Illinois, was agitated with considerable vigor and enthusiasm. The distance to be built was about $1\frac{1}{2}$ miles. The soil is the ordinary black loam, which becomes so muddy when it is wet, and so hard and smooth when it is dry. No hard road material is near by. Plans of various kinds of roads were proposed and discussed. To make a complete paved road like the city streets with stone or plank curbing was too costly, and besides for a general mixed travel it was generally conceded that a dirt road when dry and smooth was preferable to any other that could be constructed. The result of canvassing the matter fully was the adoption of a roadway combining the excellence of both, which could be built at an expense not considered expensive. The plan was proposed by Dr. Z. Waters, of

Bloomington, and would have been carried out, had not financial difficulties arisen which prevented the execution of the plan at that time.

The road, a cut of which is here given, consists of a paved center roadway made of good paving brick. In the place of curbing for the purpose of holding the brick in position, the outer edges of the roadway are arched or curved downward, as shown in the cut, so as to be supported by the firm earth. Just inside of the ends of the brick on each side of the center are laid tile drains about 18 inches deep, and parallel with the road center, for the purpose of keeping the road-bed dry, and especially for keeping the earth firm at the outer edge of the pavement. The pavement is 18 feet wide, but the outside foot on each side is taken up in making the curve, leaving an available brick roadway of 16 feet. The earth is

essential. After the road-bed is prepared and made the proper shape, it is to be rolled well with a heavy roller, after which a covering of coal cinders, two inches thick, shall be spread evenly, and well rolled. Upon this a covering of sand must be placed to form a bed upon which to place the foundation brick. Upon this prepared bed a course of brick is to be laid flatways, the long way of the brick in the direction of the road. A covering of sand should be placed on this course of brick and brushed into the crevices, and sufficient left on the top to form a bed for the surface brick. Good paving brick should now be laid on edge with the long dimension of the brick cross-ways of the road. The curved part of the pavement at the outer edge, however, should be laid with the long dimension of the brick, parallel with the line of the road, so that the curve may be well made,



drawn over the outer curve or arch, so that a well prepared earth road is left on each side, which it is expected will be generally used during the summer and fall, when earth roads are good everywhere, but when too wet for use, the hard road will be used, leaving the dirt road to dry without being ruined by travel when it is not suitable for use.

The following is a description of the manner in which the road is to be built: The bed is to be prepared by excavating sufficient earth for the pavement, so that the surface of the pavement and dirt roads at the sides will be left at the desired grade when the work is finished. The sub-grade for the pavement should be eleven inches lower than the top of the pavement when finished. Tile drains on either side should be laid about eighteen inches deep, just inside the outer border of the brick, and the trenches filled with porous material like coal cinders, though we do not think this is at all

and also for the purpose of properly resisting the impact of loads as they are drawn on and off the pavement. The work is finished by placing a coat of sand upon the surface, and sweeping it into the crevices and rolling with a heavy roller. The earth is well drawn over the outer edges of the brick, and the outer surface ditches cleaned and graded to carry off the water, and the road is constructed and ready for use.

The points claimed for this road are first, it secures the excellence of the city paved street, and also the acknowledged beauty of the country road in its season. Second, it admits of early cleaning and repairs. Third, it is one of the most durable roads, when good material and workmanship are employed.

The estimated expense of the road complete, was about forty-one dollars per lineal rod. While this expense is more than a country road can bear, yet for a heavily traveled road—which is

almost a city street in the volume of travel which must be provided for, it is cheap, and can be profitably built. The part that is paved is equal to any street pavement, while the cost is less than half that usually expended. It is a question whether this kind of road may not be very profitably constructed in the streets of many of our smaller towns, where the expense of complete paved streets prevents all attempt to make their main thoroughfares any better. We need a system of improvements for our smaller towns which is adapted to their necessities, and still keep the expense within paying limits. May not the above described road be one of the improvements in this line?—*C. G. Elliott in Drainage Journal.*

Written for the Clay-Worker.

CHEMISTRY FOR CLAYWORKERS.

Paper No. 2.

ASSUMING my young friends have acted on the advice given in my first letter, they will have all I told them, to use a trite expression, "at their finger ends;" I propose, therefore, to devote the first portion of this letter to the meaning of "atomic weights," as it will invest the table of the non-metallic elements with more interest and show additional significance to the symbols. All the elements in mass may be regarded as being built up of infinitely small portions of their own matter, and for convenience of expression these small portions are called by chemists, "atoms," and the numbers in the table represent their comparative weights.

If the question, "What is weight?" were put to a score, men taken at random, there would be, without doubt, several incongruous answers. It is well, therefore, to set out with definite ideas on this point. The amount of matter a body contains is called its weight, which in this country is expressed in grains, ounces, pounds, tons, etc., while in some European countries it is expressed in millogrammes, grammes, kilogrammes, etc. *Specific weight*, usually called *specific gravity*, expresses the ratio which the weight of a given volume of any solid or liquid body bears to the same volume of distilled water at 39.2° Fahr. It also expresses the relative densities of bodies. In short, specific gravity may be defined as the relative weight of equal volumes of different substances.

The standard for solids and liquids is

pure water at the temperature just mentioned, while for gases, atmospheric air, but oftener and preferably hydrogen is taken as the standard, and in each case the standard's weight is 1. Specific gravity may be made quite clear, I think, by an example or two; take for instance a fine specimen of pressed brick, its specific gravity, weight or density—whichever you please to call it—will be about 2.4. We will suppose the brick to measure $8 \times 4 \times 2\frac{1}{2}$ inches—I have made the thickness $2\frac{1}{2}$ inches because it will then contain ten quarter inches and be convenient for decimals. Now the weight of such a brick would be balanced by a volume of water equal to two such bricks and a split brick one inch thick, or to a block $8 \times 4 \times 6$ inches. Common bricks made from the same clay vary in specific gravity from 1.6 to 2.0. In each of these cases you will easily perceive that water blocks $8 \times 4 \times 5$ inches and $8 \times 4 \times 4$ respectively would represent their specific gravities.

Iron, with a specific gravity of 7.8, would require $3\frac{1}{4}$ pressed bricks to weigh a brick of iron the same size, or it would require a water block $8 \times 4 \times 19\frac{1}{2}$ inches to balance it. Similarly a brick of silver would be balanced by $10\frac{1}{2}$ bricks of water, and a brick of platinum by $21\frac{1}{2}$ bricks of water, whereas a brick of cork would only require a thin slab of water $\frac{5}{8}$ of an inch thick, making the specific gravity of silver 10.5, of platinum 21.5, and of cork .25. Now, I think it must be quite plain that the specific gravity of any solid or liquid will be numerically expressed by the number of volumes of pure water that will just balance one volume—equal in size, of course—of any of the solid or liquid bodies we may select.

You will, perhaps, think I am straying away from my subject. I promised to deal with atomic weights, and instead I am treating you to specific gravity, etc. I can only plead that you must have a clear conception of both absolute and specific weight—I need scarcely inform you that absolute weight is the number of grains, ounces, pounds, etc., of any substance, regardless of its bulk or volume. A pound of lead and a pound of cork are exactly the same weight, notwithstanding that one is 45 times the bulk of the other. If you are now quite clear on specific and absolute weight you are better prepared for atomic weight, for there is somewhat of a resemblance between it and specific gravity.

The weight of an atom of any substance is its relative weight compared with the atom of hydrogen as a standard, if you refer to the table of non-metallic elements in my first paper—CLAY-WORKER for May—you will find hydrogen, 1; chlorine, 35.5; iodine, 127; the atom of iodine, then, is 127 times the weight of the atom of hydrogen, and chlorine is 35.5 times the weight of the hydrogen atom. I presume by this time you are becoming inquisitive about the size of atoms. I must ask you not to bother with that question just yet, but take it for granted that their *relative* weights are what are here given for them.

Atomic weights are also known as combining weights, that is, the elements combine with each other, forming compounds, but they invariably combine according to their atomic weights; thus—I will now use the symbols, for my young friends will easily understand them by this time—H. combines with Cl. and the result is the well known substance, hydrochloric acid, also known as muriatic acid. Its modern chemical name is hydric chloride. The symbol for this compound is HCl, and the letters indicate plainly enough the two elements of which this compound is composed, but symbols indicate more than this, as I have told you before; they show the exact weight of the elements that must be used in making a compound, so that H not only means hydrogen, but 1 of hydrogen; and Cl means 35.5 of chlorine. The weight, therefore, of HCl is 36.5, being composed of 35.5 parts by weight of Cl, and 1 part by weight of H.

These atomic weights, or combining numbers, are invariable. You cannot make them combine in any other proportion. No matter how large or how small a quantity of HCl you may decompose, you will find Cl 35.5 and H 1. More than this, HCl will only combine with other bodies in weights of 36.5 or multiples of it, never in weight of 34 or 41; in fact nothing below 36.5 and nothing between it and its double, 73. HCl also means that the two elements represented are in *combination*, not simply mixed. You must not confound combining with mixing. They may at first appear much about the same thing, but there is a wide difference. If you take some dry powdered clay and some iron filings or small pieces of iron and shake them well up in a bottle containing water you will obtain a "roily" mixture

of clay, iron and water, which, if put aside to settle, would soon show the iron and clay at the bottom, with the water above them, no change having taken place in the nature or properties of any of the substances. If you now add a certain quantity of sulphuric acid or oil of vitriol and shake it up, you will soon observe a lively commotion in the bottle, and feel it too, for it will manifest itself to the sense of feeling in the form of heat. The sulphuric acid ought to be added in small quantities at a time, otherwise the bottle becomes suddenly unbearably hot and the liquids are apt to froth up and boil over. All this commotion and heat are the results of combination. No heat was felt on mixing the clay and iron with water, nor was any agitation produced among the contents of the bottle, except what was produced by shaking them up; as soon as you ceased this they began to subside and find their respective places according to their specific gravities.

Now set the bottle away and let it bubble up and do its work quietly for a few hours, then examine it again, and you will find no iron nor clay left; if all action has ceased you will find at the bottom a layer of sand, and on it a layer of "green copperas," and lying on the copperal a layer of alum; above the alum some clear water, probably. There is no longer any visible trace of the iron, nor of the alumina of the clay left; both are so thoroughly changed in their nature and properties that it requires chemical aid to identify them. This change, then, is the result of chemical combination, as distinguished from mere mixing of substances. You must not confound dissolving with combining. Some bodies are soluble in water, others are not soluble in water, but are so in alcohol, and others are soluble in naphtha, but insoluble in both water and alcohol, while others are insoluble in all three. A soluble body appears to combine with the liquid that dissolves it, but it is not so. Sugar and salt readily dissolve in water, and both lose their identity to the sense of sight, but are easily detected by the sense of taste, and by simply evaporating the water both the sugar and the salt will be precipitated and again becomes visible; in the same way the alum and the green copperas you have just recently made are both soluble in water, and would both be precipitated by evaporating the water, leaving both unchanged in their composition.

Combination, then, differs from mixture in that it produces an entirely different substance, and it takes place in definite proportions, while mixing may be done in any proportion. Of course liquids will only dissolve until they become saturated, but they will dissolve any quantity below that point. I think you will now see the difference between mixing and combining, also that dissolving is only more intimate mixing.

This may appear very dry and uninteresting, but you will begin very soon to see much beauty and usefulness that will pay a thousand fold for all this drudgery in the chemical primer. You have already begun to form compounds out of the elements, having made from the elements H and Cl, muriatic acid HCl, and here I want to show you another example of mixing and of combining; you will remember that these two elements are gases; if you mix them in equal volumes in the dark they will remain a mixture until exposed to sunlight, such as the magnesium light; then they combine with explosion. The magnesium wire or ribbon should be burned as close to the jar containing the mixture as possible, *and the more accurately the volumes of the elements are measured the more sensitive the mixture is to light.*

Now, I have said above that these gases combine in equal volumes; if you will weigh these volumes of gas, no matter what volume you may fix upon, the cubic inch, the pint, the gallon, the cubic foot, or any other volume, you will find the chlorine weighs 35.5 times the same volume of hydrogen, and this example conveys clearly the meaning of the atomic weights of elements. The atomic weights of compounds are the sums of the symbols representing the elements of which it is composed, thus taking for examples a few of the elements from the table of non-metallic bodies referred to above, and after combination they are the compounds as symbolized below:

I need not inform you that these are compounds, for I feel sure they have that appearance to you. Now, I have introduced a new feature for you to think about; that is the small figures at the bottom of the symbols. They look somewhat algebraical, but they are easily mastered. They simply indicate the number of atoms of that element they are placed after. When no figures are used, as in CO and HCl, one atom of each element is understood, and when so written or printed they are understood to have combined and formed another substance altogether, therefore, when you come across formula of this description, $N + H_3 = NH_3$ or $2H + S + 4O = H_2SO_4$. You must not conclude that the mere addition of an atom of N to 3 atoms of H will give you an atom of ammonia. All the mixing we can do will never bring them close enough to combine, and unless they are brought within the sphere of each other's attraction, they may just as well be 1,000 miles apart. The same applies to the two atoms of H, one atom of S, and four atoms of O. Mixing them will never produce sulphuric acid. If for the plus sign, +, you will read *combined with*, then you will be chemically correct, without being arithmetically incorrect.

Taking it for granted that you have read carefully all the above, and my first letter, you ought to have a tolerably good idea of the meaning of elements, atomic weights, or combining proportions, compounds, chemical combination, and mechanical mixture, symbols, etc., all of it very dull, dry, insipid stuff, but it has led you quietly without any pretense to the borders of a field full of chemical wonders and beauties, and all depending on the principles enunciated in this dull, insipid stuff. First of all let us examine the laws of combining proportions, and admire some of its beauties. The first law teaches us that *"The same substance always consists of the same elements united in the same proportions."*

Water invariably consists of oxygen

			Atomic Weight
H ₂ O	is the symbol for	Water.....	2+16=18
H ₄ C ₄	" " " "	Marsh Gas.....	4+48=52
CO	" " " "	Carbonic Oxide.....	12+16=28
CO ₂	" " " "	Carbonic Acid.....	12+32=44
NH ₃	" " " "	Ammonia.....	14+ 3=17
N ₂ O	" " " "	Laughing Gas.....	28+16=44
H ₂ SO ₄	" " " "	{ Sulphuric Acid } { Oil of Vitriol }	2+32+64=98
HCl	" " " "	Muriatic Acid.....	1+35.5=36.5

and hydrogen, and the oxygen is always eight times the weight of the hydrogen, as shown above. Carbonic acid always contains 12 of carbon and 32 of oxygen; ammonia, 14 of nitrogen and 3 of hydrogen; muriatic acid, 1 of hydrogen and 35.5 of chlorine; sal ammoniac, 36½ of muriatic acid and 17 of ammonia. This last is an example of a compound combining with another compound; the symbol of sal ammoniac is NH_4Cl .

I commenced giving the modern chemical names of some of the elements and compounds, but on second thought I have resolved to reserve them until later on, as I think one name is enough to remember at first, and the name most commonly used is the easiest to remember.

The composition of one specimen of water serves for all specimens, no matter where from or how derived; the water from an icicle is the same as that from an artesian well. There may be a difference in the impurities of water, but not in the waters themselves. The marble we get from the quarries in Vermont is identical with Italian marble, and the salt from the mines in Cheshire, England, is the same as that pumped from the wells in Michigan.

The late George Wilson, M. D. F. R. S. E., thus tersely describes the practical advantages of this law: "The service which a knowledge of this law renders to chemistry as a practical art is not less striking. In the preparation of dyes, pigments, medicines, metallic alloys, such as brass, and important chemical compounds, such as glass, soap, carbonate of soda and the like, the chemical manufacturer can avoid all useless waste of material on the one hand and all unwise economy on the other. There is one proportion and one only in which the ingredients of the substance he is manufacturing require to be supplied. The employment of more than that proportion is waste of material; the employment of less is a detrimental withholding of it. WM. WAPLINGTON.

GOOD OPENING FOR A PRACTICAL MAN—BRICK PLANT WANTED IN AFRICA.

There has been a movement made by M. Chatelein, Council to one of the districts on the West coast of Africa, near Liberia, to induce one or more brick manufacturers to either remove their plants to that portion of Africa or to operate a brick manufactory there. A list of the prominent manufacturers

of this city is in the hands of the Council, who is preparing a statement showing the location of the clay deposits and the prospects for the successful manufacture of clay products.

The Portuguese Government has started to build a railroad from the Coast to the inland, and have carried the line to Melange, a point one hundred and fifty miles distant. In an interview with an agent sent by the Council, I learn that various modes of house construction, other than brick, have been tried in the numerous towns and villages, but without success. Iron sectional houses were shipped from England but the heat of the country made them unbearable even to the Natives. The next move was towards adobe houses, which answered the purpose until the winter or rainy season set in, then the buildings became unfit for use. Frame houses next came in vogue, which are used at the present time, but they are not at all satisfactory as the ants soon cause their destruction. Is not this a victory for bricks?

NOTE ON THE COMPRESSIVE RESISTANCE OF BRICK.

THE writer has previously called attention to the fact that the flatness of the pressed surfaces greatly effect the crushing strength of cubes of brick or stone. The present note is written to present the results of some experiments made to determine the effects of different methods of preparing the pressed surfaces to the test specimens.

In testing some paving brick, the writer made some preliminary experiments by preparing the surfaces in five ways, viz: 1, grinding as nearly flat as possible upon the convex side of an emery stone, and crushing between self-adjusting, parallel, cast iron plates; 2, removing the irregularities of the surface, and crushing between blotting paper; 3, removing the irregularities of the surface, and crushing between straw boards; 4, removing the irregularities of the surface, coating with plaster of Paris and placing under slight pressure until set (12 to 24 hours), and then crushing; 5, coating with plaster of Paris which was afterwards ground down on a sand-paper disk, to the surface of the brick so as to leave a minimum thickness with a perfectly flat surface, and then crushing.

After a considerable number of experiments, it was decided that there was

no great difference between the first three methods, while the difficulties in applying the last two were so great as to render them worthless. With a grade of brick which was quite uniform in quality, the first three methods gave 7,000 to 9,000 pounds per square inch as the crushing strength of cubes. The fairly close agreement of the results was considered satisfactory evidence that the method employed secured the full strength of the brick. Subsequently the writer decided to determine the strength of cubes when the pressed surfaces were prepared with the greatest care. The samples were prepared on a rubbing bed at a marble dressing establishment, by the ordinary workmen, with instructions to secure perfectly flat surfaces. The brick were of the same grade as those referred to above, and many of the samples were the second halves of the brick used in the first experiments. The strength of the carefully prepared cubes ranged from 16,000 to 21,000 pounds per square inch, and averaged a trifle over 18,000.

The conclusion derived from the two series of experiments is that an almost imperceptible difference in the flatness of the test specimens makes a very great difference in the strength. Obviously this difference is greater the harder and more brittle the brick or stone. It is perhaps well to repeat that tests of compressive resistance of blocks of stone or brick are useful only in comparing different samples, and gives no idea of the strength of masonry constructed of these materials.

It is interesting to note that Rankine and Trautwine, standard British and American authorities, in editions of their engineers' manuals published a few years ago, give the crushing strength of the best brick at 1,100 and 4,000 pounds per square inch, respectively; while there has recently been tested in the university testing laboratory three lots of brick which averaged from 15,000 to 18,500 per square inch. The difference is probably due mainly to improvements in the manufacture of brick. The crushing strength of granite, when tested under similar conditions, is from 12,000 to 20,000.—*Ira O. Baker, Professor of Civil Engineering, University of Illinois, in the Technograph.*

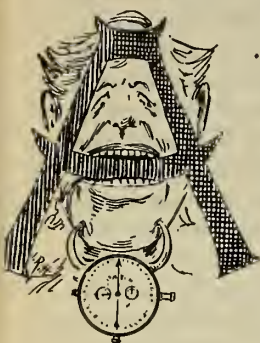
A PROVERB.

A proverb man must not forget,
And daily should repeat;
A corn upon the cob is worth
Six dozen on the feet.

—*New York Herald*

LISTENED TO THE KEY'S TONE THEN INVENTED THE LOGOMETER

A Valuable Instrument for Conventions



FTER all my labor in the interest of peace and harmony, it seems I must start all over again. This wrangle among the brethren is really quite painful. Come, come, children, this won't do! Didn't I show you how to run the convention, and run it well—as you did—an' I crave no credit. But, here you go stirring up strife after the thing is all

times by Mr. Eudaly, five times by Mr. Purington and only once by Mr. McCain.

The "and-er" is positively abhorrent when used by a public speaker. "And-er," when thus culpably applied is used in lieu of a period and frequently to begin a sentence.

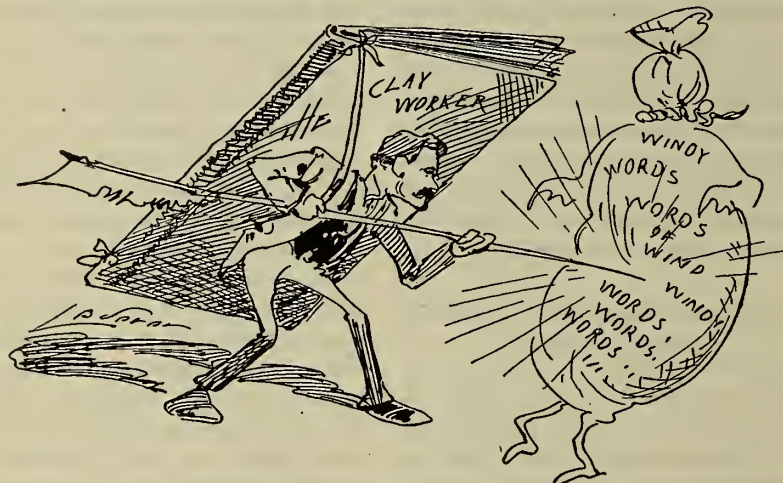
Some speakers will string hundreds of words together with no more important stop than the catch-breath "and-er."

But to my invention—

"And-er," as I was going to say, "er—"

At the next convention of the Never Bore Members Again I shall have my great-little invention ready. I meant to have it ready for the Minneapolis and Chicago conventions, but as in some minor details it is not complete—I shall

gether with a microscopic electric storage battery. One of these instruments will be applied by means of light silver clamps to the jaw of every man in the convention or other public assemblages and will keep accurate account of the words uttered by those to whom the instruments are fastened.



THE CLAY-WORKER VS. THE MOUTH WORKER.

over; here you go making one another's lives miserable just because some Philadelphia lawyer, with a head for figures and a foot for scraping clay, goes prancing into print disguised as a "Keystone." Dear me, but he is awfully off, as it were.

Why, he's got the figures all wrong. For, to confess, I had an agent at the N. B. M. A. convention who kept tab of all the words uttered.

He was there in interest of my great invention—but of that anon.

If my agent was not greatly mistaken, the figures stood like this:

Eudaly	8,562 words.
Purington	2,891 "
McCain	2,110 "

Total 13,563 "

In justice to my excellent, if somewhat verbose, friend Eudaly, it should be stated that my agent counted "and-cr" as equivalent to six words. If my agent had not done so, the figures for my esteemed, if sometimes self-advertising friend, Eudaly, would have been cut considerably. The "and-cr," so my agent informs me, was introduced 87

reserve the honor of its introduction for the next convention of the Never Become Maudlin Afterwards.

My device is called the Logometer (from Greek Logos, a word, and metron,



THE LOGOMETER IN POSITION.

a measure). Each instrument when complete will weigh less than an ounce, being composed principally of iridium, aluminum and vulcanized rubber, to-



THE LOGOMETER AT WORK.

The diaphragms and gauges in the few instruments that I have completed are working admirably, with the exception that they do not accurately register words of more than five syllables.

For instance if my fellow townsman of the silver flask, Mr. Purington, were to use one of his characteristic sentences such as, "The incomprehensibleness of the meleasomatosis of paracyanogen when applied to tourocholis tectibrinchaates superinduces in one a feeling of hypercotharsis together with a tendency to ramolisement of the right oricular." This simple statement would be counted as containing thirty-three words instead of twenty-nine, which would be manifestly unfair.

I am constantly adding more or less valuable attachments to my logometer, among them being one by which the instrument can, if necessary, be attached to the speaker's hat, thus permitting him to speak naturally and overcoming the possibility of his losing a chance to gratuitously advertise himself.

CHAS. LEDERER.

The man in the moon has one advantage over his terrestrial brothers—the fuller he gets the more brilliant he grows.—*Life*.

Written for the Clay-Worker.

DRY PRESS POINTERS.

As with every other new innovation, there seems to be a strong reluctance—to say the least—in adopting or even unprejudicially investigating the dry or semi-dry brickmaking process. I am willing to admit that there are objections to this process, but these, when carefully weighed against the many advantages, disappear and are forgotten in the satisfaction which ensues as the result of such comparison. As every brickmaker knows, clay varies in its nature just as much as it is possible for anything to vary. Some clay will make good brick by any process, while others require to be very carefully tried and judged before the process is decided on. This is especially the case in dry or semi-dry making. It is best to have the clay tried by more than one process, and on more than one machine; the latter especially, as, although various machines are called by the same name, as dry, semi-dry, etc., the process of manipulation in the machine is sometimes entirely different. I have heard brick works engineers say, when asked their opinion on the different machines, "Well, if I had a weak clay, easily worked, I would put in the — or the —, but if I had a strong, heavy clay I would certainly put in the —. Now I do not propose to discuss the merits of any machine by name in this paper, but only to give a general sketch of my idea of the making of brick by this process. Having decided that our clay will make good bricks economically by the dry or semi-dry process and being satisfied as to its manipulation by one or more machines, it still remains for us to investigate one important point more, viz., which of these machines compares most favorably with economical running and freedom from break-downs from any cause. It is a matter of importance to us to know whether we shall want one machinist for three machines, or three machinists for one machine. To find out the above we must, as I said before, investigate, not superficially, but thoroughly, the record of each machine. Let us, by all means, see the machine in practical operation; not on exhibition, but in its ordinary every-day labor. There are a good many points in its operation that we must watch. We must notice the build, whether it is constructed in a thoroughly workmanlike manner and on correct mechanical

principles, does it run steadily and smoothly, without any strain at the pressing point; does the charger do its duty effectually and without "spurts" or an unnecessary waste of clay; are all the parts adjustable that ought to be so; is the steam heating arrangement reliable and effective; is the "take in" of clay easily and quickly regulated? These and many other points I could name have been crowded on to me by "sore experience," and, although they are simple enough in themselves, they are of vital importance to the success of any machine, but I am sorry to say are almost always overlooked in the selection of machines by unexperienced men.

It is with brick machines as with men, according to the old song, "Judge not a man by the coat that he wears." A nice appearance does not make either a good man or machine. Having satisfied ourselves on the above points, and decided on our machine, we have struck the key note of our plant.

Our next move must be to decide on our method of preparing or reducing the clay for the machines. If we are going in for red brick exclusively an ordinary pulverizer or disintegrator will answer our purpose well enough, but if we have fire clay or shales to deal with I say, by all means, put in a dry grinding pan, with perforated bottom. Of course pulverizer and disintegrator manufacturers will tell us that their speciality will disintegrate or pulverize fire clay or shales as easily as red clay. Again "sore experience" compels me to say that such is not true. I have yet to meet the first pulverizer or disintegrator that will reduce fire clay or shales fine and even enough to make good dry or semi-dry bricks. Now, having fixed our reducing apparatus to our satisfaction, we must turn our attention to the elevating and conveying of material to our machines. For this purpose I have found nothing better than an ordinary bucket elevator, and ordinary inclined, perforated, stationary screens of a pitch of about nine inches to the foot for semi-dry, and rather less for dry clay. This latter apparatus is easy and simple to make. It is a box or chute about 18 inches deep, and the width inside of our screen say about twenty-six inches. A rib is then screwed on the inside, seven inches from the bottom, extending the whole length of box. Two similar ribs are then screwed or nailed on the screen, one under each edge. These

ribs rest on the ribs inside the box, and are screwed to box from the outside. This gives easy access for cleaning out. At the end of the box and above the screen we must cut a hole about 8 in. X 6 in., and connects another chute to carry tailings, roots, stones, etc., away, or if only clay lumps, back to pan or pulverizer. This arrangement is simple, inexpensive, does not get out of order, and does not require any power to work it.

We can either moisten our clay at the pan or pulverizer by a fine spray of water, or by a steam jet at the point of delivery into the machine. The latter method I prefer, as the clay is moistened more evenly, making a much better brick, and that it is more expeditious to reduce and convey dry clay in a moist state. It is also more under the control of the press man, which is a decided advantage, as our success in drying and burning is very largely influenced by an uniformity of density in our bricks. Right here I would like to suggest that we select a good, painstaking, careful man for this job, and make it to his interest to give the best of satisfaction, both in the quality of bricks and in the care of his machines. In a subsequent paper I hope to present a few more "hints" on this process to the readers of your (or our) valuable trade journal.

PRESS.

GETTING A LIVING.

If men or women in America are willing to work at anything honest that they can find to do, they can always have plenty to do, and living wages for doing it, if they *will do it* industriously and faithfully. Bucephalus was once dropped down in a city of the Mississippi Valley, an utter stranger, with just five dollars in his pocket. It was in the dull times after the panic of 1857, and the town was full of men, "out of work." Yet there was lots of work to be done; and Bucephalus started out to hunt a job, without a doubt of finding one. He felt sure there were a good many men who wanted just such a man as he knew himself to be. It did not take him a whole day to find his man, though he had no reference or introduction save his broad shoulders and ready hands. He has never lacked a job since.—Ex.

It is not wealth nor state, but the git up and git that makes a man great.

IMPROVED CLAYWORKING MACHINERY.

THAT progress in the manufacture of clayworking machinery is not a thing of the past has been conclusively demonstrated by the large number of new and useful machines which have, in the past few months, been devised and placed upon the market. The present status of affairs in the brick-making industry is largely responsible for this, and has done much to foster and encourage manufacturers of late to use their best efforts in this line. This is owing to the fact that a large percentage of the works now erected for the manufacture of brick are controlled and owned by capitalists and representative business men, who recognize the value of improved machinery and processes of manufacture, and realize to what a large extent their success hinges upon the use of suitable first class machinery and appliances. Their example is also being followed by the smaller manufacturing concerns, though on a correspondingly small scale, and all progressive brick manufacturers are beginning to see clearly that, whether the amount of machinery they use be much or little, it should be of good quality, and well adapted to withstand the heavy strain and severe usage to which this class of machinery is subjected.

These remarks are called forth by the examination of a combined clay disintegrator and crusher just placed upon the market, and which we illustrate herewith. The machine is of neat design throughout, is self-contained, very strong and heavy in all its parts,

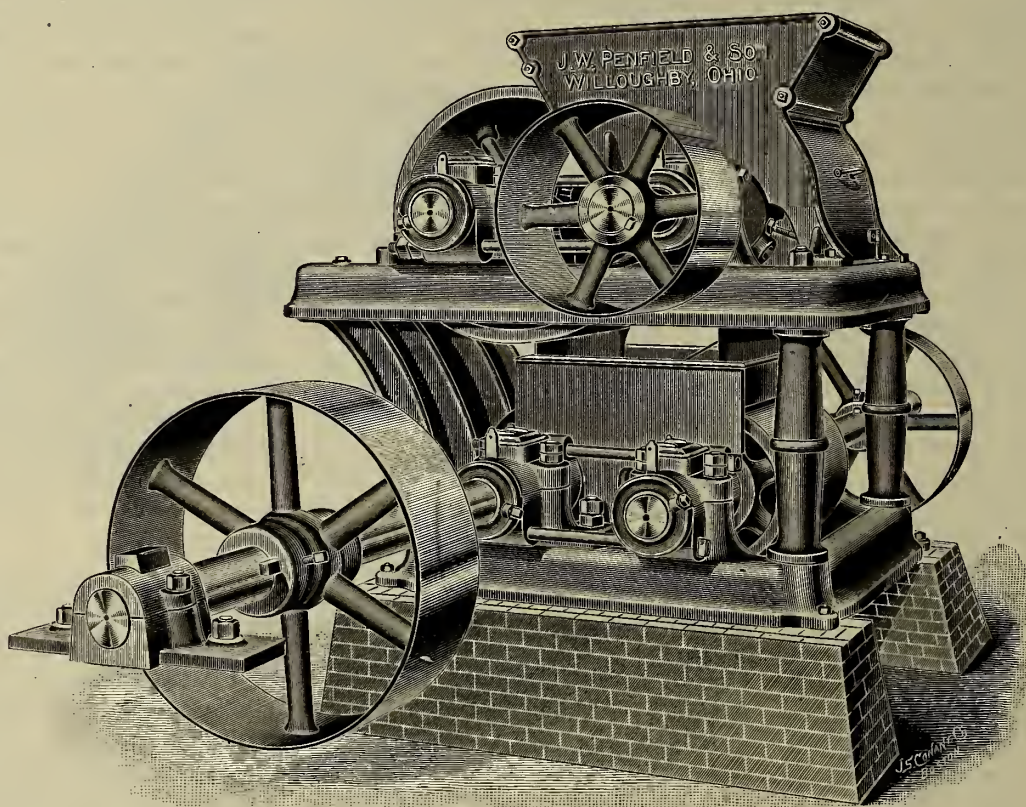
and the great beauty of it is that, owing to the simplicity of its construction and the freedom from unnecessary and complicated contrivances, any one can understand and operate it successfully.

The upper mechanism of the machine consists of two heavy chilled disintegrating rollers mounted upon a suitable iron base. These rollers differ in diameter and speed of operation, and the smaller and high speed roller is provided with a number of adjustable steel cutting bars distributed at equal intervals around its periphery. In this manner successive portions of the clay are removed, and the original fibre and

to the rollers is also worthy of careful consideration, being at once the simplest and most satisfactory plan ever adopted in the manufacture of this class of machinery. The center shaft of each roller is extended out long enough to receive the driving pulleys. There are no noisy gears, sprocket wheels or chains, no unreliable friction devices, or short roller-connecting belts to impart the motion from one roller to the other, but each roller has an independent positive motion. As the rollers in this machine should revolve at a high rate of speed to insure the best results, the wisdom of the above arrangement

will be fully appreciated.

The manufacturers, Messrs. Penfield & Son, are certainly entitled to congratulations upon the production of this ingenious and highly useful machine, which we understand is only one of a large number of new and improved clayworking and brickmaking appliances lately produced by them at their recently enlarged and ex-



24-INCH COMBINED DISINTEGRATOR AND CRUSHER.

and grain of the material thoroughly broken up and destroyed. As the disintegrated material emerges from the upper rollers it falls into the hopper of the lower crusher, which is provided with two suitable crushing rollers. These rollers are chilled, and after being cast are placed in a special machine which grinds them off perfectly true while revolving upon their own journals; consequently the rollers can be set very close together, insuring thorough and even reduction of the material to be manipulated.

The general design of the machine, and method of communicating power

tensive factories at Willoughby, Ohio.

THE RAILWAY DINNER.

MENU.

"Superfish,"
Bing!
"Stakerliver."
Bang!
"Tearcough."
Sling!
"Cheeserackers."
Slang!
"Nutsrapples."
Stung!

All out!

Fifty cents.

Awlaboard!

Ph-wiz!

—Unknown Humorist.

CORRESPONDENCE.

THESE COLUMNS ARE OPEN TO ALL. THE FULL NAME AND ADDRESS IS REQUIRED BUT WILL NOT BE PUBLISHED EXCEPT WHEN PERMISSION IS GIVEN BY CORRESPONDENT. THOSE DESIRING TO COMMUNICATE PRIVATELY WITH ANY CORRESPONDENT WHOSE FULL NAME IS NOT GIVEN CAN DO SO BY ADDRESSING LETTERS CARE OF CLAY-WORKER.

The Art of Clayworking.

Editor Clay-Worker:

Before coming to the subject proper of the manufacture of Glaze Roofing Tiles there are one or two points closely connected with this matter arising out of questions that are being put to me by gentlemen corresponding with me, which are of general interest, and which I would like, by your permission, to refer to.

It is said that history repeats itself, and it is certain that the individual, as well, as the nation when forming new combinations and entering on new industries wade through the same difficulties, and make the same mistakes, owing to the same errors of judgement as other persons and nations have done long years before, and it is no uncommon thing for the person or the nation to look down from their advanced position with contempt on those who are toiling up the same track but a long way behind them.

Now, the magnitude of the brick business, in America, when taken in the aggregate is a little more than we can grasp in this country. We think that a place making twelve or fifteen million a year is a very large concern, and certainly places of this sort are very few and far between, and therefore when we read of the capacity of your kilns holding 400,000, of your brick machine making 100,000 per day, and of one works turning out from 50,000,000 to 100,000,000 a year and then think of the aggregate production of one district with its 650,000,000 and another with its 1,200,000,000 and then carry our minds on to, where these are all buried—well, to say that we are left is not the word, we are just simply blind and groping for the door.

But when all has been said for the past energy and powers of organization on the part of the manufacturers and the inventive genius of the kiln builder and the machine maker, it can, I think, be fully demonstrated by careful observation, and by inferential reasoning, that the clayworking industries of your country are only in the embryo state. (The manufacture of common building brick excepted).

In the first place we may ask what is the basis of your discussions at your annual conventions? Simply bricks. The papers read and the discussions following being on the preferences given to, and the advantages derived from the condition of the clay at the point when it is first made into bricks, whether it shall be stiff, or soft, dry or semi-dry, the best machines for dealing with the clay on this point, the best dryers for drying the bricks when made, the best kiln in which to burn the bricks and the most suitable heat producer for burning the bricks. All these things are of the utmost importance to the brick manufacturer, and are fit subjects for consideration and discussion, but they are all on one dead level. There is a great deal said about paving brick, and a great rush to provide a good track for the feet, but absolutely nothing is said about those things of sanitary efficiency and usefulness, which are so needful in the building on the sidewalk, and which are essential to the pleasures and comfort of an enlightened people. Internal and external decoration in which is included the highest order of usefulness with the purest ideal of the ornamental is the outcome of the progressive ideas of a free people; and to minister to these ideas is the legitimate and proper sphere of the clayworker, for all the beautiful forms in sculpture and architecture, and in all the beautiful, harmonious blending of color by the painter, all are attainable by the clayworker, to which is combined the durability of his product, which, in its beauty and freshness, will last forever; but our inference is that this part of the clayworker's art is still in its embryo state.

But we would ask, is there any indications of a change in the public mind in your country tending towards the uplifting of the art of the clayworker to a higher platform? Is there any desire to possess these higher productions? We are able to say that there is this indication of a forward movement in this direction, from what do we gather this conviction; first in the fact that there is a demand for various colored bricks as indicated in a speech made at your convention on the Mixing of Clays, producing, it is said, twenty different colors of brick, this, I presume, to please the eye without altering the structural value of the product.

Again, I read that a manufacturer had an accident and made a kiln of speckled

bricks and thought he had made a loss but who subsequently found that he was the happy discoverer of a new sort that has been in demand ever since.

Again, a gentleman, a manufacturer, writing to me says that the latest discovery is a brick made from a mixture of clay of various colors and covered with a colorless glaze. This is I suppose an idea taken from the scrogged work produced in this country on some of the finest art pottery ware, and is very beautiful on this class of goods, and we see in these things the advancing idea in the West to combine the beautiful with the useful. True, these things may appear incongruous and out of line. With good taste they are nevertheless on the lines of progress, and show an unmistakable evidence of the uprising of public sentiment and aspirations after the beautiful in color and design. The useful, viewed from a sanitary standpoint, as a preventive of infection and disease. The ornamental incorporated on the strict lines of truth in the most elaborate manner into all the designs of the architect. It is my own impression that the public mind of the country on these questions is in advance of the efforts of manufacturers to meet this demand. The demand for common building bricks appears to have occupied the minds of the manufacturers as to have left them little time to think of these other things, and there must be a wide field, the fringe of which has scarcely yet been touched, for profitable investment. There is nothing in the life of a nation that marks so distinctly the effort in the progress of its wealth and social position as its clay products. Iron and steel and electricity have done wonders in taking the curves and bends out of the roads, and thus shortening the distances between given points, improving the methods of communication between nations, and giving greater facility for the interchange of thought and the transmission of its commerce; but these things have all increased our knowledge of the arts of war and our modern ironclads with their present equipments convey to our minds the ideas of war and not of peace. But it is not so with the clay products of a nation; they convey to the mind the idea of peace and contentment, of social enjoyment, of the advancement of good taste, of refinement of manners, of the increase of its wealth and the improvement of its social

position, and mark in an unmistakable manner, the progress of all the internal and external influences, which are the moving power in the growth of all the social ideas, which are the characteristics of an enlightened people.

It is within my own knowledge, when the brown porrenger was thought to be good enough for the working classes in this country to drink their tea out of, that is, when they could get any to drink, and the few ornaments that stood upon the mantle shelf were made of the same materials, that is, where there was either the one or the other of these things, but now a full set of China is not thought to be too good for every day use. Fifty years ago the cottages of the working classes of this country were not fit to stable a horse in. A press brick was not known in many parts of the country, but now we see on every hand improved dwellings, in the various patterns of tile floors, efficient drainage, and pressed brick fronts, relieved with an ornamental string course and various colored design, and, in many cases, terra cotta doors, and window heads and sills. The same may be said of all the great corporations of the country. Thirty years ago the Midland Railway Company built a large station on a section of their line at Sheffield. They did the urinals and lavatories with what was then called enameled bricks. The whole of the building, with this exception, being done with ordinary brick and stone, but sixty miles further North, at the town of Bradford, they have just erected a large station, the urinals and lavatories are on a large scale, paved throughout with grey, stone colored enameled bricks, with a string course of chocolate. The approaches to the platforms, the booking offices, the whole of the waiting rooms are done throughout with a beautiful design in colored enameled bricks and tiles, including the fire-places and the pillars that support the roof. These cases might be multiplied. I have been making a holiday tour through the country for a few weeks making notes in passing on the changes that have taken place within my own memory, in the social position, the enlightened ideas and luxurious tastes as marked by the great advances made in the last forty years in the beauty and variety of our clay products, and the uses to which they have been applied. I have no doubt but this distinguishing feature in the clay products of your country will be

seen and the era of speckled and scrogged bricks will pass away, and the next generation will look at your cottages, your factories and work-shops, your public buildings and railway stations, the pleasure ground of the private mansion and public parks, on the paving of your street and the efficient system of the drainage of your towns and cities in which will be interwoven and incorporate all the beautiful productions of the clayworkers art, made on the purest principles of design; and not by accident then will be seen the general application of all those higher productions of the clayworker. Enameled bricks and tiles, architectural terra cotta brick work and garden terra cotta, encaustic tiles, glazed roofing tiles and floor tiles, and all those manifold and varied articles required by the sanitary engineer. All these requirements will have to be met by the clayworker, and it will be my object in subsequent papers to give some details of the methods of manufacture of some of these things—to begin with, glazed roofing tiles.

MANAGER.

Specimen Enamels.

Editor Clay-Worker:

I notice a letter signed "Manager" in April issue of CLAY-WORKER, just received, in which reference is made to me with regard to samples of enamel. As before stated in these columns, I have been for some time in correspondence with this gentleman on the subject of glazes, and have, in my possession, samples of all colors and shades of his enamel, any of which I will be happy to send to any one really interested in the subject. I would, however, much prefer not parting with the samples, which are really beautiful. There are different classes of white, which, though at first sight appearing very similar, develop very distinct features on closer inspection. I would, therefore, suggest that it would be easier and better to apply direct for any samples required. I need not, I am sure, add, that no one should ask for samples of this kind unless there is every prospect of real business at the bottom of it.

R. M. GREER.

Wait a Minute—A Timely Suggestion.

Editor Clay-Worker:

I have been reading the remarks of "Keystone," Bro. McCain and others, and want to just say that I have been president of a Builders' and Traders'

Exchange long enough to learn that a few men in almost all organizations do the bulk of the talking, and we need them. They are brainy men, of large experience and able to teach others. It has been my good fortune to listen to the three men criticised, and I must admit I was instructed as well as edified, and I should not like to be the one to tell them to "dry up," but as another has said, if a four day convention is not enough let's have six, and hear from all, but on the other hand, for the benefit of the timid and the new comer to our conventions who may fear that he shall intrude, I would suggest that the class criticised wait sixty or one hundred and twenty seconds for the fainter hearted to gather themselves. When if they do not rise and stand on their feet, and pour out upon us the oil of their eloquence and experience, then let those grand men, who have done so much to build up our National Conventions, step out and fill up the silent blank. *Sixty seconds silence* will, we believe, wake the dead or raise the living in any Brick-makers' Convention.

Yours Truly,

Syracuse, N. Y. C. H. MERRICK,

P. S:—Enclosed please find \$2.00 for your valuable paper.

A Good Opening.

Editor Clay-Worker:

Enclosed find money order for subscription to CLAY-WORKER. I am a nurseman, but I had my fingers in the clay for a number of years back in old Ohio, and I often have a yearning for the same work.

There is a good opening here for brick works. The brick here are mostly made by convict labor, which is strictly in violation of our State laws, and could be easily stopped. We have clay suitable for paving brick or fine pressed fronts in abundance. Have had clay tested at Akron, Ohio, both for sewer pipe and for pottery and it is pronounced first-class, better by far than anything they have there. We have valuable beds of kaoline suitable for manufacture of white ware. Coal is plenty, and the best in the world, can be had in car loads at \$2.00 per ton. Brick sell at \$7.00 at kiln, and very poor ones they are. They use nothing but the top surface, in fact, nothing but sand in their construction. Stone ware is necessarily sold high, having to be shipped from Red Wing, Minn., or Akron, Ohio. I see no reason why there should not be

a grand opening here for the right parties to start a plant for manufacturing all kinds of clay products. Roofing tile is an article that would be largely used in this section as there is no slate and all the buildings in Denver and Pueblo are covered with common shingles, although they do ship some tile from Akron, Ohio. The Pueblo Opera House and Union Station are covered with tile made at Akron.

It is not necessary for me to say anything about our climate. You have all heard enough about that. We have a fine little city of some 5,000 people. Canon City has never experienced a boom but has made a steady, substantial growth and will surely continue to do so. Parties starting clay works here would have no difficulty securing the necessary land and clay at scarcely any cost, possibly.

Now, Mr. Editor, I did not intend saying anything, but only to send you the subscription. I enjoy reading your paper very much indeed, and am always glad to see it. You have heard the old saying, "Once a brickmaker, a brickmaker for ever."

E. F. JEWETT.

Canon City, Colo.

Brick vs Stone Pavements.

Editor Clay-Worker:

Your inquiry of the 23 inst, is at hand. There has been considerable paving brick used in this city the last two years, especially by real estate allotment men. The city has done very little in that line, and it will probably be a long time before the authorities will recognize the merits of paving brick, as the Medina (N. Y.) sandstone seems to be the exclusive favorite.

Paving brick are not laid here upon proper foundations and they have been found fault with on account of the streets becoming full of holes. This is not owing to the wearing out of the brick, but to a foundation of a sandy soil. This same trouble holds equally true with the Medina sandstone pavements, but the holes on these don't seem to bother certain people as much as those on a brick pavement. What the streets in this city are mostly in need of at present are foundations of crushed stone, same as they make in the small towns surrounding us, and then brick will get the credit its quality justly merits.

A properly vitrified brick will last as long as the sandstone that is used in this city, and would cost less than half

as much, besides we have in this vicinity as good if not better clay for making vitrified brick than exists in any other section of the country. The first vitrified brick ever put on the market were made from these clays, so were also the rock-face brick, that have become such a universal favorite, but to-day this section is probably the least progressive in the use of such material. All owing, no doubt, to other selfish interests, as well as the proverbial slowness of our home capitalists taking advantage in developing our raw material.

The pressed brick that are now being made near this city, are superior in color, strength, finish and density to any in the United States. While this is saying much, it is nevertheless true, and it is gratifying to note that enterprising architects and builders are rapidly beginning to give it a substantial and well deserved recognition. So you see this section has done a little something towards supplying the building world with a better material, even if paving brick are but little used here comparatively.

T. S. G.

Cleveland, May 26, 1892.

Pitch or No Pitch.

Editor Clay-Worker:

Please find enclosed postal note for \$2.00 subscription for your valuable paper for one year.

Having been engaged in the production of the cheapest illuminant in the world for the past three years, I may be rather *passé* on the question appertaining to the brick business. But like all lovers of the art, I have used every opportunity to keep myself posted on such matters.

During the past year our beautiful town has used vast quantities of brick for street paving, and one who, in the olden times, stuck in the deep mud on our Main Street, would be astonished at the wonderful improvement. I have watched with a great deal of interest during this spring, what the result would be of the two different ways of putting down brick pavement used here. You must know first that the foundation is a very deep bed of fine red brick clay, covering the whole site of Butler town. The first lot of paving done was on Main Street. The contract was not let until late in the season, so it was impossible to finish it all last year, or rather year before last. Part of the pavement was actually put down upon a bed of broken stone. The latter

being almost puddled into a thin bed of mud. I feared this foundation would settle and leave pot holes, but I have yet to notice the first hole. This pavement was finely finished up by pounding hot pitch into the crevices.

A very severe frost during this past winter apparently had no effect upon the pavement. Two other streets paved in the same way except the use of the hot pitch, were put down this last summer. As the traffic will not be so heavy on these two latter streets, they will, no doubt, last just as long. My opinion has been in favor of the hot pitch work. I should like though to hear from some of your better informed contributors as to the value of the pitch and no pitch.

There are two yards here making common red brick. One uses a Creager machine, the other make by hand.

There are no pressed brick made here, and indeed very few even in the city of Pittsburgh, forty miles south. Most of the pressed brick used hereabouts come from the East.

Last season a stock company built what is known as the Armory building, a fine, large block, of red brick with pressed brick front, but I notice already that the "white wash," as many call the white discoloration on brick walls, has made quite an ugly looking front of it.

I have asked many brickmakers and bricklayers and others if they could give a reason for this despoiler of beauty. but have yet to find a satisfactory answer. For this reason I am personally in favor of other colors for brick buildings than red. Of course clays are not found in all parts of the country that would be suitable for different colors, but just here in this "neck 'o woods," one can make most any color desired, if they only know how to do it.

There has been some talk here recently of organizing a stock company to manufacture paving brick. The material is here, also good shipping facilities.

While I have no personal acquaintance with you dear editor, I almost feel that I had known you, and the craft for years. I shall be delighted if at some future time I may be enabled to take you by the hand and thank you for the many points I have gained from reading your valuable paper, but I believe all editors prefer short letters and lots of them (if they are the right kind), hence I will not string this out further at this time.

W. R. OSBORNE.

Butler, Pa.

What is Good Clay.

Editor Clay-Worker:

Of course, the chemical constituents of these shales is very important, and should be known before attempting the manufacture of vitrified brick, but like Prof. Orton, I believe the mineralogical structure is worthy of consideration as well as the chemical one with reference to their value. Some one asks, in nearly every mail, what minerals usually go to make up clay? In the economic Geology of Ohio the above authority, than whom there is no better, says that "clays are composed of kaolinite, quartz, mica, feldspar, iron, cobalt, zinc, copper, magnesia, lime, etc.," but to the uninitiated, these descriptions are liable to be misleading, inasmuch as the above constituents are rarely found all of them in every clay, and he says there is no theory worthy of consideration at present concerning the difference between flint and plastic clays. When the brickmaker, as he has been educated to understand these terms, meets them in actual work, he finds a consideration, which, to him, means a difference both deep and wide, whether his clay is flint or plastic, I will admit that, in chemical nomenclature, it is a point in constituency of water hydration, and is apparently dependent upon their physical structure.

My experience in testing clays, both analytic and physical demonstrations of manufactured products, particularly with reference to vitrified brick, that most of our best material, in other respects, contains constituents, though small in proportion, are often sufficient to act as a flux, and thus should be mentioned—in making, not drying or burning—before the best results are attainable. It is generally known that with refractory clays, we generally find traces of iron and potash present, and, if asked the question, I could hardly state which is worse, though, in my experience, I would about as soon have both as one, in the aggregate, to contend with, for it strikes me that both present can be rendered impotent, in so far as fluxing is concerned, as either one, and this is about all the harm they accomplish.

In the manufacture, when the point of vitrification is barely reached, and not carried beyond, iron, of course, will not flux as bad as potash. On the other hand, in clays from all sections east of the Rocky Mountains, I find iron much more abundant than potash, conse-

quently the former is really a more important factor as an impurity, or deleterious element, rather in the clay than the latter, because we have none of it. As I told you when you had me before your conventions on diverse occasions, this iron, as an ingredient, is very imperfectly understood. Chemists usually name three kinds, the simple, oxide, protoxide, etc. Nearly all fire clays carry this sesquioxide, this variety requires a much more intense heat to melt than does the protoxide when combined—it is rarely free—with the clay. One of the most important factors in clay for the manufacture of vitrified products is silica. In our best shales, this element is present in an extremely finely powdered state, in fact, as fine as can be made by any artificial mechanical methods, and the nearer forty per cent. it is present, the better the clay for this purpose. Now, iron will only combine with the silica in its protoxide state, and, if analysis shows this condition of the iron, has been brought about by the ordinary processes of nature, it is much easier to effect the combination of the silica with the iron by artificial heat in firing. Generally speaking, the more valuable the shale, in other respects, the more liable the iron is to appear, in which event the principal question to be determined by the analyst is the name of the iron and the proper prefix to the name.

It will be remembered by those whom I had the pleasure of meeting, both at Memphis and Columbus, we had a rather excited discussion regarding the iron and water in clays. Our mutual friend Eudaly being eternally on the "off" side,—but this is a way he has of getting facts, and so we will excuse him,—but our friend Raymond, of Dayton, settled the controversy at one of these places, by denominating the combined moisture, "Holy Water," and I believe I have inadvertently written "Raymond's Holy Water," in hundreds of certificates. Now, this "Holy Water," of which our friend speaks, occupies the same relative position as does some of these irons, and I wish he would call Ferrous Sulphate, Holy Iron, for nearly all clays have traces; it is a bad ingredient to have around at burning time, for when we see all the eye brick standing perfect, everything going along finely, just when the brick begins to show the color of vitrification this sulphate decomposes, and, no matter what the fuel, whatever make of kiln, or whoever the burner, a

decomposition arises producing a still lower oxide of iron, and a flux, and consequently distortion is the inevitable result. Sometimes, though not generally, we find iron present in the form of a silicate, in the natural deposit, this detracts from the value of the clay, inasmuch as in this condition, it meets before vitrification is nearly reached, and taking up the lime and magnesia, we have indeed a fluxed batch, and a hard kiln to burn to get even an ordinary yield of ordinary brick.

As the primary requisites of brick for paving purposes, also the modus operandi of manufacture is not, strictly speaking, within my province, suffice it to say, the various city authorities have prepared specifications best suited to their requirements and tastes, and while I can make all demonstrations to meet them, none can be presented that will cover the exigencies of every blank for bids. A paver should be very dense and have a homogeneous structure,—no veneer—and should absorb but very little moisture, the less the better. This requirement you will find in all specifications, and is a very important factor. No water, no frost; the clay should stand up well so as to permit a hard burn, but should not be too refractory. A low grade of fire clay is no good for pavers. The better the fire clay the worse paver it will make, a fact that should be more generally known. As stated before, the clay should contain a large proportion of silica, this will produce a brick that will withstand abrasion, which is a much more important factor than compression, though some manufacturers place great stress on crushing strength, but this cuts no figure for practical use by the side abrasive resistance. Most of the shales carry sufficient iron, alumina, to give strength and toughness, and extraneous matters to produce vitrification, in fact more contain too much than too little. The greatest care should be observed in drying and as near perfect crystallization produced as possible. Commensurate with the proportion and nature of the fluxing material present, all pavers should be annealed thoroughly so the physical relation which ensues may be so gradual as not to "shorten," weaken tenacity or cohesion.

I have just completed some tests of pavers submitted in completion for various bids of a few cities, and will submit results so that you may note requirements and how the results compare:

PHYSICAL DEMONSTRATIONS.

Mark.	Size.	Spalling Total Stress.	Maximum Total Stress.	Remarks.
No. 1,020.	1.985 in.x1.986 in.	43,850	45,440	Color, brown; broke into small pieces; powdered.
No. 1,021.	1 in.x1 in.	Intact.	47,716	Brown; cracks parallel with top.
No. 1,022.	2 in.x2.5 in.	No Spalling.	50,092	Reddish brown; good break.
No. 1,023.	2 in.x1.99 in.	87,420	91,892	Slate; cracks parallel.
No. 1,024.	1 in.x1 in. plus.	No Spalling.	73,920	Drab; good fracture.
No. 1,025.	1.999 in.x1.999 in.	69,800	48,500	Red; not thoroughly vitrified.
No. 1,026.	1 in.x1 in.	81,284	90,726	Brown.

The foregoing taken from ordinary run of laboratory work, will show tests to which all brick are usually subjected on bids. In my next I will give some further tests and demonstrations with sample analyses of clays that show the best of results both in physical demonstrations and actual use. Anything not fully understood, now is the time to ask.

J. F. ELSOM.

A Voice From Utah.

Editor Clay-Worker:

I take the liberty of writing a few lines for the CLAY-WORKER to let my brickmaking friends know what we are doing away out in Utah, the land of children and Alfalfa. It is claimed that Utah's best crop is children. That is right. She cannot be beat for children, and we have another good crop out here. That is brick—the finest in the land. I am burning brick for the Anderson Pressed Brick Co., of Harrisville, four miles from Ogden, on the V. P. R. R. I have been making and burning brick all over the East and West for twenty-five years, and I must say I have never seen or burned a better dry press brick. They will compete with any press brick that is made between St. Louis and the coast. They have a fine Lion brick machine, and a four-brick Kennedy, which they are going to throw out and put in another Lion. They have the finest clay I have seen anywhere for making different colored brick. They make some eight or ten different colors, all from the same clay bank. Their clay bank runs about twenty-five feet deep, with about two feet of black clay on top, which makes a fine red brick. The clay underneath makes a white brick, which can't be beat, and by mixing the clay properly we get the different colors. We make a red brick, a white brick, and cream and pink and marble brick, which are fine, and we make a speckled brick, which beats anything I ever saw. It looks just like red granite.

The company have sale for all they

can make. They have good shipping facilities, and ship a great many to Salt Lake City and all west of here, clear to California. They have the common up-draft, clamp kiln, which holds three hundred thousand; fifteen arches in a kiln, forty high and forty-two wide, and dry them off in four days with cheap coal; use no wood at all, and burn in eleven days, water smoke and all, with 85 or 90 tons of coal; burn them hard to the top, and don't spoil three hundred brick in my arches. I leave my arches as straight as when they are set. Some old fogies think pressed brick can't be watersmoked with coal. That is all bosh, as may be demonstrated here. I have burned in all kinds of clay, and do all my watersmoking with coal. I will try to give my brickmaking friends a history of this part of the country and the people in the near future, through the CLAY-WORKER.

A HARD BAT.

To "R. Brick" and "William."

Editor Clay-Worker:

Allow me through the columns of the CLAY-WORKER to thank "R. Brick" for his explicit description of a hot floor dryer in CLAY-WORKER for March, 1892.

I am ready to admit I have never seen a hot floor dryer that had the same, nor near the same attention paid to the details, but I have seen some on the same principle, and would unhesitatingly give the preference to "R. Brick's" floor, but I am by no means convinced of its superiority over, or its equality to, the properly arranged steam dryer. Therefore my advice to "William" would be, test your steam dryer thoroughly, and I think you will covet nobody's hot floor dryer.

I—like "R. Brick"—have no desire to enter into a controversy on the subject; would much prefer it in such hands as Mr. S. P. Crafts and his Hackensack adjutant; they champion a dryer that "licks all creation," as the CLAY-WORKER readers well know.

I am always a gainer by "Bro. Brick's" letters, and would like him to describe as clearly the arrangement of the shed that covers his hot floor, and his *modus operandi* of working his dryer.

WM. WAPLINGTON.

Philadelphia News.

Editor Clay-Worker:

It is the most natural thing in the world to be dissatisfied with the present, and long for something better in the future. This is the way it is with the brickmakers of this city, and in fact with the manufacturers of everything that goes into and about buildings. There is a good deal of work going on, but we will fall a few million dollars behind last year's work in all probability. Instead of building blocks of one hundred houses, we are building ten, and instead of making contracts for large amounts of material, we are buying in small quantities. At the same time there is but little idle labor, and no decided depression in the building trades. House building is being pushed in all parts of the city, especially in the north-eastern section, where land is low in price, and where it is expected an elevated road will soon reach, although we may possibly be disappointed in this. Philadelphia is suffering for want of rapid transit, and only last week an ordinance was vetoed by the Mayor, which would have given us an electrical system or roads. We have 510 miles of street car road in this town, and people are so fond of creeping along at the rate of two and a half miles an hour behind horses' tails that they compelled the Mayor to veto a measure which would have enabled the hustlers among us to get around quick. But—so it is. We must get into the crowd on the pavements, or else take the streets for it. Reference is made to this point simply to show that suburban house building has received, or will receive, a set back. If we had a trolley system here, land five miles out would advance in value, and the brickmakers would soon have all the work they could do. The speed is needed, the space is wanted, the houses and bricks would be wanted, but we are obliged to wait a little while longer. The excuse is that we will wait until some storage battery is invented which will propel cars rapidly and safely.

Our brickmakers are all doing a good business, and, so far as daily and weekly operations are concerned, it looks as

though business was booming. The yards are working to full capacity. Two or three companies are looking for new sites. Some land has recently been purchased in the South-west, and in the "neek" section, by way of preparation for building in these two directions. A company was organized not long ago for improvement in that section of the city on a large scale. The granite cutter's strike is interfering with the prosecution of work on some of our buildings. This is the only labor difficulty we have had this year.

The manufacturers of brick machinery are having a good deal of work from small concerns in the interior of the State and New Jersey. The clayworking interests are receiving the attention of a good many inventors, and some of their devices are being introduced with economy and advantage, though not until after thorough experiments have been made. The manufacturers of fire brick in this State have had a good year so far, and all of them, so far as our reports go, will run full time all this year. There is an active demand at present for sewer pipe, and will be while the building season lasts. Generally the machine manufacturers report a good condition of trade, and excellent prospects.

QUAKER.

A Brickmakers Log Book.

Editor Clay-Worker:

Every vessel that goes off soundings keeps a "Log." It is a matter of fact that the good ship "Brick" has been beyond sounding for the past year or two. The Captain respectfully submits it to the underwriters, the many readers of the CLAY-WORKER. Between the 25th and 28th of April began to take in stores slowly at first as machinery and men are rather stiff from being idle so long.

Weather all that could be desired; yards damp; brick do not dry very well. Rain washed brick; looks squally in the South; possibly a hod hoister disturbance of the business situation; looks as if the good ship was going to encounter bad weather early in the season. All serene; squall passed without much delay; molding when it does not rain. Looks heavy and dark in the North; may not do any damage. The manufacturers in the Eastern States may feel the effect. Government agents stopping men from coming to work in the yards, as they are previously en-

gaged, so they say. Phew! What next. If the men in power had looked the matter over before they acted they would have discovered the velvet hand of the Labor Union. The idea of imported labor. There is not a Frenchman in the Dominion but knows that he can get all the work on the yards he wants. The august personage, the Government official, takes a back seat. Labor men disappointed.

Sun on a strike for the past three days; yards full of green brick.

Passed a ship, hull down; looks like New York and New Jersey Association, she has not reported since April 6th.

Spoke ship, "Vice President" out of supplies; somewhat strange; commenced taking in cargo before all others. Captain should have started more than one yard before he telegraphed, "Would wait orders." Showery; lots of washed brick; no work on the yards.

Two of our captains in charge of their yard; in the one case with great success; in the other if he would employ a deep "waterpilot" at \$4.00 a day, his vessel would find smoother water. Possibly the "hand has lost its cunning," if it ever had any, for burning brick.

Got the sun at meridian to-day, but found that we were not progressing very fast. Permits for new buildings coming out from day to day are but few in number. If but few brick are made but few are required.

Heavy thunder heard in the distance. What's on the carpet next? It looks as if there would be more than a cap full of wind from the East.

Lookout reports a vessel with a new number, seems to be a stranger. Hailed her and were pleased to find that it was the new ship "Connecticut Association." First voyage out. Captain reports things working nicely. Manufacturers getting \$7.00 per M. for their brick, with a happy lot of brickmakers in the Nutmeg State.

Requested the skipper to keep a lookout, as we thought we had passed N. Y. and N. J. Association. If he met her to report the success of his new vessel; she has shown what can be done when men and officers pull together; not as in our fleet, where the men in command start when it suits them, and then want the rest to lay at the anchor. Possibly by the time she is heard from again, which in all likelihood will be about August, when some of the large manufacturers will want the rest to curtail in the out-

put. By that time she may require some repairs, and it would then be a good time to change officers.

A heavy easterly gale blowing, which, if reports are to be believed, will have a very serious effect on the building trade. As our vessel has become used to the troublesome waters of N. Y., we will keep full sail on her even if it hails granite.

More rain; there are not over four or five pits of smooth brick set as yet. The only happy men on the yards are the engineers, as their time goes on, rain or no rain, mold or no mold.

Sighted a fore and aft vessel deeply loaded, bear down on her, and find it is the A. J. Williams with a load of molding sand from Hackensack, consigned to W. K. Hammond, Long Island. Hailed the Captain, asked him how Billy is. "Oh, he is all right, he knows where to get good sand." Yes, Hackensack has lots of good molding sand, and nine-tenths of the manufacturers have lots of "Sand" when it comes to doing anything to help the brick market. They will "Rate A. 1 at Lloyd's" every time. Do not need to have a petition circulated among them to curtail the production of brick, as two years ago some of them did not sign but stopped sending their vessel to New York market, while in other cases, there was a similarity to a yacht race in which the Editor of the *Herald* was a participant. The race was to be around Long Island. Bennet's vessel was behind at the east end of the Island. He took a short cut through Plum Gut and thereby got in the still water of the Sound and won the race.

In the case of the brick manufacturer, his vessel sailed for Yonkers and was found at 79th St., North River, New York, discharging cargo, after agreeing to keep off the market. When some one looked aloft, there at the mast head was the pennant of the Vice Admiral. Consistent, was it not? He was court-martialed; the blame was all the Captain's of the vessel; he had made a mistake.

During the war the Government bought a lot of old whale ships, loaded them with stone to sink them across the entrance of some of the harbors to stop blockade runners. On their way down the coast a Yankee skipper hailed them and wanted to know what they were and where bound. The last part of the reply fits the case of our brick skipper, in the opinion of all. It was this "Rat

Hole Fleet, bound South, with *sealed orders*."

For a change, for two days in succession we have had a severe hail-storm.

Time book of the yards shows but six days made in two weeks; too much rain; a poor showing for the men.

Reports from the market not at all encouraging. Supply light. Demand lighter yet. Prices about the same as last month, but like the sword of Damocles, hanging by a single hair, liable to fall at any moment. Hard from \$4.50 to \$5.75; Pale \$1.25 to \$1.50 per M.

Barque Felter Bros. sighted discharging cargo at rate of 30,000 per day in cars for country market. Keep at it boys; anything but the N. Y. market. It will be sometime before the returns will reach the pile. The syndicate would have paid, if it had materialized, at the present rate for stock.

Last fall I mentioned the retirement from business of R. A. Vervalen, long and favorably known as the inventor and manufacturer of the machine that bears his name. On the 18th of the present month he quietly passed away at his home in Haverstraw. He was buried in Mount Repose Cemetery of that place. At different times during his life he filled official positions. He was Mayor of Haverstraw several times, and at one time Postmaster.

To-day, May 31st, it has been clear part of the day. Yesterday in the afternoon we had quite a shower. Possibly after the two conventions meet, the weather may settle. Certainly the politicians and weather are both off.

A. N. OLDTIMER,

Hackensack, N. J.

St. Louis News Items.

Editor Clay-Worker:

At St. Louis, as at many other points, rain has interfered considerably with work at the brickyards the past month. It was impossible to get any clay in the sheds, and unless the weather settles soon, brick will be scarce next spring.

The Hydraulic Co. report good progress in the construction of their new yard at Menominee, Wis., though they will hardly finish it in time to be in the market this year.

An amusing thing occurred at Anthony Ittner's South St. Louis yard last week. There are two breweries in the immediate neighborhood, and competition between them is very brisk. One

day one of them sent in two kegs of beer to the hands, and the day following, not to be outdone, the other brewery did the same thing. If this keeps up Mr. Ittner will be flooded with applications for work. As the beer was not touched by the hands until after six o'clock, Mr. Ittner permitted the men to take it.

The Excelsior Brick Co. is burning its last kiln. After this, and what they now have on hand is disposed of, they will shut down completely.

The Illinois Supply & Construction Co. were hampered by wet weather in the construction of their yard at Collinsville, but they are now hustling things pretty lively.

Evans & Howard were also delayed somewhat in the work on the additions to their plant. These will probably cost \$200,000, instead of \$100,000, the original estimate. **TERRA COTTA.**

USES OF BURNT-CLAY MORTAR IN ITALY.

The United States Consul at Catania, in his last report, says that visitors at Catania invariably notice and remark on the peculiar soft pink color of all the unpainted buildings. This coloring is the result of using cement or mortar of proved value, found in the vicinity, and which is nothing more nor less than burnt clay. In the frequent eruptions of Mount Etna in times past great beds of clay were covered and buried from 20 to 200 feet by the lava streams, with the result, when the eruption happened in the dry season, of burning and converting these clay beds into a fine red gravel or powder. These deposits are mined, and are considered very valuable. The material, mixed with a little lime and the usual amount of water, forms a mortar or cement considered superior to any other cement for building purposes, and has been used in Catania to the exclusion of all other materials for centuries. Every building in Catania is constructed of lava liberally cemented with this mortar. In building, small irregular stones are used, just as they happen to come, and a smooth surface is afterwards given by a thin coating of mortar, inside and out, which can then be divided by a trowel to imitate blocks of stone, if desired. This burnt clay, with lime, makes a very strong and adhesive mortar; no

other material would hold together the large four and six-story apartment houses, which are built entirely of small irregular stones. It also has unequaled wearing and resisting power, as the extensive harbor breakwater proves. This breakwater was built some ten years ago, and extends for three-quarters of a mile out into the sea, and is said to be as good to-day as when first built. It is composed entirely of lava, and for a foot below water-mark to a sufficient height to protect the shipping, of huge blocks of small lava rubble liberally cemented with the mortar. The constant wear and tear of the sea for ten years has only damaged the cement in insignificant places, and probably only where there happened to be an air-space between the mortar and stones caused by faulty construction of the blocks. Consul Heath adds that the more he looks into the matter the more he is convinced of the value of this mortar as an economic substitute for all the high-priced hydraulic cements now used, and that it might well be adopted in other countries besides Italy.

MEERSCHAUM IS A KIND OF CLAY

Found Only In Turkish Mines—How Pipes are often Spoiled.

There is a very general impresson in the minds of smokers that the meersch- aum part of the pipe which they treasure so carefully and take so much pride and satisfaction in "coloring" is compressed sea foam. Such, however, is not the case. The German word meersch- aum means, in English, foam of the sea, but its formation has nothing to do with the sea. It is a kind of clay, comes out of mines like coal, and is found only in Turkey. The artist who carves meersch- aum is required to pass through as severe a school of apprenticeship lasting from three to ten years, as though his work were in marble. Meersch- aum carved and in the rough resembles the ordinary plaster cast. The outlines being complete, it is scraped with a knife, filed, soaked in a preparation, and then polished with a linen cloth. The color of meersch- aum has nothing to do with the quality, and ranges from pure white to a light yellow or bluish white. The practice sometimes indulged in by smokers of soaking a meersch- aum in hot water, milk, or steaming it, is altogether wrong. It spoils the meersch- aum and ruins the color.—*Chicago Herald.*

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PRACTICAL EDUCATION.

Schools of handicraft, trade schools, manual schools, are crowding upon the antiquated methods, the behind the time methods, of our American public school system. The Americans are behind the Scotch, Germans, French, and possibly other European countries, in their educational work. In spite of our boasted practicability, we are less practical than the sections of the old world which we have mentioned. This does not come, we would have it understood, through superior intelligence, but rather through necessity. Competition is fierce in the Old World. Everything that can be done must be done in order to add to the resources of the people of the country.

With us, who are living in a rich territory, in a section of the world where it is easy to earn a living, we find a disposition to be less thoughtful, less careful of the future. We send our children to school; they learn to read and write; they learn arithmetic and the more complicated branches. Where we miss it however, is in that we do not give a practical direction to the work of the mind and a distinct training to the work of the hand. The general school system of our country is behind the trade organization.

The Builders' Exchanges of the country are all giving more or less attention to improvements in handicraft, and in time the effect of this work will

make itself felt with those who have to do with the management of public schools, so that they will either have to step down and out or reform and re-direct the present circumlocution, time wasting methods of our common school system. Our young men who are without resources behind them, find it necessary to leave school in order to make a living. The school systems of France and Germany teach young men and young woman how to earn a living as soon as they leave school. They teach them how to use their hands as well as their minds. They teach them how to make themselves useful. These schools are severely practical and those who have not gone through them or been influenced by them, are in a sad state. Yet it is impossible for these young people to keep out of school, education being compulsory, and it is impossible for them to avoid the practical influences of the technical, manual, or schools of handicraft. Where the mind is trained to add to the dexterity of the hand, the raw material which comes in contact with that hand or mind, is made more valuable than by less skillful or less intelligent handling.

We are thoroughly in sympathy with the trade schools of this country and we shall hope in the future to treat upon the practical details of their organization with a view of promoting their good.

A BRICK FAMINE.

The City of Indianapolis and vicinity is on the eve of a brick famine; at the beginning of the greatest building season which we have had for years, we are without the supply of brick. For a month or more everyday rains have been the rule, and as most of our brick-makers are without cover, the result can be readily imagined. While it is true that we have been able to lay very few brick, the brickmakers have been able to make even less. A few days of dry weather will develop the fact that there are practically no brick to be had. It is the brickmaker who can supply the market at all times who has the trade at the highest price. He makes the best brick and is always in the market. The open air yards or those with a few sheds and no adequate protection from the elements are still common in this vicinity. A few of the yards which have sheds and protection for the bricks, are realizing a very large profit from

their products. Such men alone are the ones who make profits on the business. Not alone when business is dull, but when it is close. When they have to, they can sell brick as cheap or cheaper than any one, but when the market is stiff they are able to realize the highest price.

"To them that hath it shall be given, to them that hath not it shall be taken away, even that which he hath."

A SHORT SERMON.

Our text reads: "Hold fast that which is good," and it may be easily found by anyone who looks for it. But some people never find it. They come to, "Test all things," and stop reading to put into practice what they have found, and at once they set about trying first this and then that, without noticing that they are told to hold fast to a good thing when they have found it. Such people seldom, if ever, succeed in anything. When boys they went through the orchard tasting every variety of fruit before them until their power of taste was satiated, and then, out of sheer exhaustion, they had to quit, without having eaten satisfactorily a single good apple. As men we find them the victims of the peddler of patent churns, patent washing machines and patent everything else, and their sheds and workshops are cluttered up with the relics of their folly. Some of these machines had proved useful in the hands of those who held fast to good things when they found them, but in the hands of try-everythings they had been failures. They listened to the glib tongues of the agents and solicitors and believed that the new churn would not only churn itself, but would make butter out of skimmed milk, and on a pinch furnish the milk gratis. Perhaps in no line of business is the unsophisticated more frequently victimized than in the line of advertising. The most common method of imposing upon the inexperienced business man is in getting out some bogus paper which is to be issued by the thousands and to be distributed gratuitously, or to listen to the song of some new enterprise which is to bound at once into a circulation of a hundred thousand or so. The result usually is failure, yet, nevertheless, men of experience, men who ought to know better, nay, men who do know better, are induced to patronize them, because they are cheap. The wise advertiser, he

who knows a good thing and holds fast to it, always patronizes papers of established character. They know that advertising schemes are nearly always frauds, and are in the hands of mere adventurers, and that papers that have yet to get their readers are not the papers through which to reach buyers.

It is because our advertisers have found the CLAY-WORKER so good for them that they *hold fast*, and continue from month to month and from year to year. And in nothing is our text more applicable than in suggesting to those who have profited by advertising, to hold fast to advertising. It the easiest thing in the world to let another take your business by neglecting the admonition of our text, "Hold fast that which is good."

WANTED, GLAZED BRICK.

The architect still complains of his inability to obtain cheap glazed brick. From this it may be understood that it is not the expensive enamel brick that is wanted, but rather an inexpensive glazed brick, one that may be used for the outside walls of foundations, the inside walls of cellars, of courts, and other places where the brickwork is exposed to the action of moisture. The most recent demand, said this architect, for these glazed brick is for use in a stable. There was a partition to be built between a stall-room and a carriage house. The ammonia from a stall-room plays sad havoc with the varnish of the vehicles, and nothing can be better than an impervious wall to prevent its ravages. "I am making plans for a stable," said he, "and if I could only lay my hands on a glazed brick of moderate cost, I would use it not alone in this partition but also for the stall linings in the harness room and for all of the inside linings of a cow-stable, and when I had but finished I could feel quite certain that it was altogether a model structure. Nothing we could come in contact with would be so foul that water would not wash it off. A glazed brick would be impervious and altogether satisfactory."

Not long since the architect referred to had a school house to build. He said that in the halls and corridors, waiting rooms, water closets, basement play-rooms, and in all rooms excepting the school rooms, nothing could be better than glazed brick. Brick with a gray crock glaze or even a brown glaze,

with the reflective qualities which these have, the light in the rooms and halls would be reflected and the result would be the best.

When we come to consider these matters as coming up in everyday practice, of dwelling houses, tenement buildings, courts, of stores, school houses, stables, ware houses and all other structures of similar character, we can but see that if there was a supply for this crying demand, that the field of the clayworker would be largely increased.

THIS SEASON'S LESSON.

Throughout almost the entire United States there has been altogether too much rain and too little sunshine this season. The farmers are not the only sufferers from this unusual condition of things; the brickmakers have had their full share. Brickmaking on open yards is practically at a stand-still, entailing heavy losses on the manufacturers, and causing a threatened brick famine in many of the larger cities. Last year's brick have given out, and this year's brick are not forthcoming.

The lesson has been forced upon brickmakers this season that the open yards can no longer be run at a profit. The modern brick factory, with its equipment of improved machinery, adapted to be run in all kinds of weather and at all seasons of the year, must inevitably supplant the old-fashioned open yard with its slow and uncertain product. In a modern dry press brick plant not only the machinery but the clay itself is under cover, and the man who has the foresight to fill his clay-shed by October or November can run continuously until the following June if he so desires. He is a lucky man this Spring who has had a full clay-shed and a reliable brick press. Even Chicago is threatened with a brick famine, and in some localities the price of brick is advancing steadily at the rate of 50 cents per M. per day.

The twenty-seven rainy days in May, just passed, should not fail to bring their lesson home to the old-fashioned brickmakers, and also to the man just embarking in the business. The day of the open brickyard and the old style methods and machinery is passed. Evolution is the order of the day, and it has reached the brickyard. To insure profits nowadays, it is absolutely necessary to have a modern dry clay plant, equipped with the most improved ma-

chinery, which will run without breakdowns, stoppages or delays from any cause.

GIVE THE LEFT HAND A CHANCE.

Many a boy has grown to maturity comparatively helpless, because the unwise parent never put any thing upon him. The older brother, having the hang of things, was expected to do everything, even to helping the younger in things he could learn to do if put at it. If the older brother dies the younger brother is put at work, and he soon develops possibilities not dreamed of before. Just so with the left hand. We would not like to do without it, yet there is very little we can do with it, simply because we have not put it into exercise, so that it is apt to be regarded as only an assistant in emergencies. We not only do not expect anything from it, but in many instances we refuse to let it follow nature and take the lead. This is all wrong. If the right hand is missing from any cause we soon learn to utilize the left, and find it capable of everything the right usually does. Give the left hand a chance, not only when a physical construction naturally makes it the leader, but develop it by education, even against its inclination at first. We want handy men, and no man is truly handy with but one hand educated. It may require patience and perseverance, but these will be rewarded with a good left hand.

SUNSHINE.

Sunshine is a good thing for brick-making; indeed, there is no substitute for it, but it is just as good for brickmakers. Somber days are the dread of the yard, but somber men are more to be dreaded, whether they be employers or the employed. Get up right end foremost every morning, and let the sunshine into your chamber, and then open the chambers of your heart and let sunshine into it. There is plenty of sunshine without; don't keep it out of your chamber by blinds or curtains, and you will sleep better when night comes; and there is moral sunshine ready to enter your heart if you will not curtain it with gloomy thoughts and gloomy forebodings. Let it in. Look upon the sunny side of everything, for there is a sunny side to everything, and you will eat better, sleep better and make better brick, as well as a better husband, a

better father, a better brother, a better employer and a better employe. Commend us to the little boy, whose loud laugh tells of sunshine within, but he is nothing compared with the man whose sunshiny heart is forever overflowing with kind words and even boisterous laughter. Cultivate sunshine within and it will shine without; or rather let the sunshine that is abundant without find a ready entrance within, and it will speak for itself.

TRADE LITERATURE.

BRICK FOR STREET PAVEMENTS is the title of a little book recently published by Robert Clark & Co., of Cincinnati. Price, 50 cents. It contains an account of tests made of bricks and paving blocks, with a brief discussion of street pavements, and the methods of constructing them by, M. D. Burke, a well known civil engineer. Those of our readers desiring a copy, can obtain it by applying to the publishers as above.

PLAIN FACTS is the title of a little pamphlet published by the Somerset & Johnsonburg Mfg. Co., Somerset, Mass., which deals with Johnson's patent economical kiln for burning brick of all kinds and other clay products. Copy will be sent free to any of our readers who write them.

A TREATISE ON TILE DRAINAGE and irrigation has been published by the Ambcy (Ind.) Tile & Brick Works. It contains a brief history of farm drainage and considerable other interesting matter bearing on that subject.

AUGER BRICK MACHINES is the subject of a twelve-page pamphlet just issued by J. W. Penfield & Son, Willoughby, Ohio. Copy will be sent free to any of our readers who will write them, mentioning the *CLAY-WORKER*.

THE COLEMAN MONITOR DRYER is fully described and illustrated in a handsome manner in a catalogue issued by the Jennings Machine Co., Philadelphia. The Monitor is the invention of Wm. H. Coleman, formerly of Chicago. It is claimed to be the most rapid and economical of steam dryers. Its many advantages are fully set forth in the catalogue, copy of which will be mailed to anyone applying for it.

GRAPHITE PRODUCTIONS, a forty-page pamphlet, is published by the Jos. Dixon Crucible Co., Jersey City, N. J., illustrating and describing their various pro-

ductions, which include Dixon's Graphite Grease, which is conceded to be the best lubricant known to science, Dixon's Graphite Paint, especially suited for use on smoke-stacks, boiler fronts and other iron work; Dixon's Traction Belt Dressing and Leather Preservative, Dixon's crucibles, pencils, etc. The list is too long for enumeration here. Those of our readers who are interested may inform themselves by writing for a catalogue.

THE COALDALE (Ala.) BRICK & TILE Co. has favored us with their pocket catalogue of ornamental and pressed brick made by them. They also manufacture fire brick and coke oven blocks.

THE WABASH LINE. We are indebted to G. D. Maxfield, D. P. A., at Indianapolis, of this famous railroad, for a copy of an elegantly printed pamphlet giving an account of a trip recently made by a special train, which was run from Chicago to St. Louis for the Lillian Russell Opera Co. The distance, 286 miles, was made in six hours, and at some points a wonderful speed was attained. For instance, the run from Bement to Decatur (21 miles), was made in seventeen minutes. On the front or title page of the pamphlet appears a beautiful portrait of the fair Lillian; then follows an autograph letter bearing her signature, thanking Mr. F. Chandler, G. P. A. at St. Louis, for the splendid service rendered. The balance of the pamphlet is devoted to illustrations of the train, which consisted of five cars, including a diner. One particular feature that attracted our attention is a photograph of the monster locomotive used. It is one of several that the Wabash is now using on their "Banner Route" between Chicago and St. Louis. They are superb machines, and were built entirely by Wabash employes at the Wabash shops, Springfield, Ill., and are claimed to be the most perfect, fastest and most powerful engines in the country. They weigh 89 tons each, and are capable of making and sustaining a speed of eighty miles an hour. With such powerful engines it is little wonder that Wabash fast trains between the two cities named have gained the reputation among travelers of being always on time.

If you want anything you haven't got or have something you don't want, read or advertise in our "Wanted, For Sale, Etc.," columns.

A MARKED CONTRAST.

To an American visiting Europe, says Chas. Kendall Adams in *Good Roads*, there is nothing more impressive than the general excellence of the roads. Their climate is more rainy than ours, and their roads, under the same conditions, would probably be even worse than those usually met with in America. But in England, in France, in Germany, and in Switzerland, everywhere one goes, the excellence of the roads is a constant source of surprise to one visiting those countries. During the last Summer it was my fortune to take a long drive in the Alps. The party was made up of six persons. A coach was employed for the whole trip. We were thirty-three days in the coach and during that time we went over four of the great passes and traveled nearly a thousand miles. But the matter of chief significance to those interested in good roads is the fact that, although we drove from twenty-five to fifty miles a day for more than a month in these mountainous regions, the whole trip was done with one team of horses. No change was made, and none was needed. More than that, it was our opinion that the horses were in better condition at the end of August than they had been at the beginning of the trip, a little after the middle of July. Could there be any more significant commentary on the quality of the roads? What would be the condition of a team of horses in Midsummer in America which had been driven over mountain roads at the rate of from twenty-five to fifty miles a day for six days in a week?

IS IT A MATTER OF POLITICS?

It isn't "The Chinese must go," but "The Chinese mustn't come," if Congress can prevent it. Well, that serves him right. In the first place, he had no business being born at all, and secondly and chiefly, he has no business to be born in China. But that isn't the worst of it. When he gets here he is so utterly lost to the chief end of American life that he never votes. If he would rush to the poles like the Italians and Russians and the Poles do, or if he joined the Anarchists and threw dynamite bombs into public meetings, or set fire to buildings and clamored for bread or blood without working for the bread, there would be some chance for him. But he never votes. That is an unpar-

donable sin in America. And then he works cheap if he cannot get dear work to do, and he manages to live within his means; and he has no idea what dynamite is made of or what it is good for, hence he must not come to this land of free lances and cheap citizenship, while our gates are wide open for everybody else who has money enough to pay passage over the seas and board until the next election.

THE END OF THE SCHOOL YEAR.

Nearly every man, whether he is in the brick business, or any other business, has a son or daughter or a friend, who is interested directly or indirectly in the graduating exercises of our high schools, academies and colleges. It is the disposition of some of us to look lightly upon these exercises. We see the hope that is expressed, the high view of life which is taken by these young men and women and some of us are disposed to smile at them and say that it is altogether ideal and unreal, and that they are dreams which will not be realized. Now this is all wrong. If we look squarely at it, take a rational view of the subject, see these bright interesting, clear skinned people, hear what they say, we can readily understand that their principles are all right, all true, and that the rest of the world is wrong. There is enough of high thought and good principle, splendid ideals of high and right living expressed during the graduating exercises of any high school, academy or college, to move the world, and the only regret that we have in connection therewith, is the fact that so many who start out with such bright promises, such high hopes, when they get out into the world and mix with the people and see the common successes which come to the people of the world, that they drop down with them, neglect good principles and in time become but a part and parcel of the very common existence. There is cause for sorrow in all this when we realize that if these young men and women who leave their schools to go into the world, full of the hope that they express and of the high ideals that they feel, could but cling to their sentiments, put them into everyday practice, put them into the brickyards, the shops and the homes, carry them into the everyday life of the mechanic and the children; if they could but do this, the world would soon move to a high plane, we would all have less to

fear from the adverse movement of things. If one wants to get a bright view of life, see what real hope means, and how little discouragement is felt by the graduates, let him attend a school commencement. Let the brickmaker go there with his daughter or his son, hear what they say, and if he has only a little hope and a little confidence in human nature, he will come away altogether refreshed and consequently encouraged with respect to his own living and the years which remain to him.

JOHN MCCAIN SANDBAGGED.

While on his way home at 10:30 P. M., May 17th, John McCain, the well known brick manufacturer of Denver, was way-laid by thieves, who tried to "slug" him.

The blow aimed at his head landed on his neck and failed to stun him as expected. In falling Mr. McCain threw himself on the side where his pocket-book was. He also held his watch in his hand.

Before the footpads had time to go through his pockets a number of people coming from the theater heard his cries and rushed to his assistance.

Mr. McCain held on to his watch, and the chain breaking he saved it.

Father McCain should heed the advice of the old song: "Remember and be home 'ere the clock strikes nine."

A PRACTICAL SUGGESTION.

TO BRICKMAKERS:—A large proportion of those who go into the manufacture of dry pressed brick do so without any adequate knowledge as to the condition their clay should be put in, the proper machinery to use for putting it in that condition, and the best and most economical arrangement of their plants. The result too often is, that expensive machinery is put in, which has to be afterward thrown aside and replaced by something better adapted to that particular clay; or a plant has to be entirely re-arranged in order to be conveniently and economically operated. This causes unnecessary expense and serious delays.

All these matters have had careful study by us. The practical experience gained in starting and operating more than 200 brick plants on all known brickmaking materials, enables us to know just what is required for putting any particular clay into proper condition at the least expense to our customer; and also the best and most economical

arrangement for the brick plant itself. We freely give our own customers the benefit of this experience. Like education, it cannot be purchased, it can only be learned. Without the proper instructions, however, this education will cost a brickmaker thousands of dollars, as it has us. We are therefore prepared to make plans for our customers, and specifications of just what is required to insure success from the beginning; thus saving them the expense, loss and delays attending upon the mistakes of the inexperienced. Experience is a high-priced teacher, and the wise man is he who lets others pay for the lessons and profits himself by the results. [See ads. on pages 636-687.]

CHISHOLM, BOYD & WHITE.

NEW INVENTIONS.

The following is a lists of patents appertaining to brick, tile, terra-cotta, sewer pipe, pottery, etc., and the machinery used in their manufacture, issued since our last number.

- 474,807 and 575,433. Brick kiln. Max A. Th. Boehncke, Centinela, Cal.
- 474,022. Brick kiln. Stephen J. Plant, Momence, Ill.
- 475,234. Pavement. John A. Chanler, New York, N. Y.
- 475,237. Brick kiln. William Crumlic, Decatur, Ill.
- 475,267. Brick kiln. Anton Dimpel, Munich, Germany.
- 475,483. Clay reducer. Walfrid Burkman, San Francisco, Cal.
- 475,915. Process of preparing clay. Phineas Arnold, Canal Dover, Ohio.
- 475,924. Paving block. Stephen Breden and James Sheldan, Franklin, Pa.
- 476,438. Screen for clay, ores, etc. Eugene A. Austin, Boulder, Colo.
- 476,627. Tile or brick cutter. E. M. Freese, Galion, Ohio.
- 476,705. Brick machine. William C. Vannelan, Anderson, Ind.

BURLINGTON ROUTE NEW SERVICE

The Burlington Route is the best railroad from Chicago and St. Louis to Kansas City, St. Paul, Minneapolis, Deadwood, Omaha and Denver. Through Sleeping Cars, Chicago to San Francisco via Denver, Leadville, Salt Lake City and Ogden; also one Chicago to Deadwood, S. D. All its trains are equipped with Pullman Sleeping Cars, Standard Chair Cars (seats free) and meals are served in Burlington Route Dining Cars. If you are going west, take the BEST LINE.

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ANTHONY ITTNER,

MANUFACTURER OF

ST. LOUIS AND BELLEVILLE PRESSED AND ORNAMENTAL BRICK.

OFFICE ADDRESS:

ANTHONY ITTNER, Builders Exchange, Telephone Bldg., St. Louis, Mo.
St. Louis Works, California Avenue Belleville Works, L. & N. R. R. near
and Sidney Street. Belleville, Ill.

Fine Press Brick, 10,000,000	Total Yearly
Ornamental " 2,000,000	Capacity:
Common Press " 15,000,000	27,000,000.

Our Press Brick have sharp and well defined angles, and are free from the objectionable mark or streak, so frequently seen running lengthwise through the face of the other dry clay brick, and commonly called "granulation."

The color of our brick being a beautiful dark cherry red, equal to any manufactured in this country.

The Dies we use are a Patent of our own devising, in which the liners can be renewed at a trifling cost, hence we have no occasion to let the liners become so badly worn as to mar the corners and edges of the brick.

We also have a PATENT REVOLVING UPRIGHT STEEL BRUSH PULVERIZER, which leaves the clay loose and flaky, a condition so favorable for making a solid uniform homogeneous brick, which, under the trowel, can be cut into any shape without breaking.

Ours is the only DRY CLAY Brick Works in the United States that harvests and gathers the clay in its depth, thus securing a standard, uniform brick, year in and year out, continuously.

The results of the above advantages are accounted for and seen in the following certificate, which speaks for itself:

BOSTON, Feb. 15, 1889.

MESSRS. ITTNER BROS., St. Louis, Mo.

GENTLEMEN:—We have carved the brick panel you sent us and ship same to you this day. Although we have had a large experience in brick carving, we do not hesitate to pronounce your brick the best for carving purposes that we ever used.

Yours truly,

EVANS & TOMBS.

We keep large quantities of Press Brick in stock, and are prepared to fill large orders on short notice. We pack them carefully in straw, so that they can be shipped long distances without material damage.

BOOKS FOR BRICKMAKERS.

It is pretty generally conceded that wonderful progress is being made in the ancient and heretofore unprogressive art of brickmaking. Among the best evidences of this is the fact that the brick-making craft is no longer without a literature of its own. There are now some good practical books treating on the manipulation of clay—the making, drying and burning of brick. The list is not so large but that every brickmaker can afford to have them all. Get them and read them.

"BRICKMAKER'S MANUAL,"
Morrison and Reep, \$3.00

"BRICKMAKING AND BURNING,"
J. W. Crary, Sr., 2.50

"TABLE OF ANALYSES OF CLAYS,"
Alfred Crossley, 1.00

"DURABILITY OF BRICK PAVEMENTS,"
Prof. I. O. Baker, .25

Mailed, postage free, on receipt of price. All of them to one address for \$5.50. Address the publishers, T. A. RANDALL & Co., Indianapolis, Ind.

THE CLAY WORKER.

THE OFFICIAL ORGAN OF THE NATIONAL BRICK MANUFACTURERS' ASSOCIATION OF THE UNITED STATES OF AMERICA.

VOL. XVIII.

INDIANAPOLIS, IND., JULY, 1892.

No. 1

Written for the Clay-Worker.

HOLLAND BRICK WORK.

THINK how nicely this design would work up in brick and terra cotta. It is constructed of brick and stone. However, it is a worthy object lesson. This particular building exists in Eutrich, in Holland, and is representative of the character of design which was generally employed in structures of this kind during the latter part of the 17th century. There has been a revival of this sort of design in Germany and Holland, during recent years, but the building which we present is quite a good example of this style and one which may well serve as a guide to people interested in the architecture of that time. In the last number of the CLAY-WORKER we gave a view of the Chateau of Blois or that part of it which was constructed

the same forms in all other respects, we would have a design utterly lacking in character. It would be fussy and meaningless. Without this diagonal pattern and with the light terra cotta and stone in the way in which it is used here, there would be a spotted, restless, exaggerated effect, which would relieve the design of the elements of success which there are in it. By having this broken

that the effect of the whole is restful rather than exaggerated and strained.

The principles of design illustrated in this way are worthy of study. The artist or architect who designed this structure may not have reasoned it all out exactly in this way. He may not have said to himself: "I will have my brick laid up in this way that I may handle my stone in the other way," but he may have felt intuitively that it would have been bad design for him to have used the stone in the way in which it is used here, without having a proper background of the brick work. It is altogether possible for him to have known this by instinct and without being able to formulate his knowledge, he accomplished the result independent thereof. It is generally the way with artists. They feel these things without being able to formulate them. They do



A HOLLAND BUILDING.

wall surface one is able to spot it up with the stone or terra cotta in the way that it is done here, but if we had the plain wall surface, and put in stone and terra cotta irrespective of the diagonals, we would have a building which is altogether glaring and crude. With the brick laid up in this way there is something for the other work to rest against. There is competition and interest so

good work through instinct, and it is the professor of design who comes along afterwards, studies his work, and finds out why it was good. Yet the one who reasons about it in this way is rarely or never able to do the high class work that was done originally by the artist who worked merely through artistic instinct.

Taking this statement as a basis

one might say that it is better not to study, not to look up old examples, and take old designs, but rather to work from an artistic instinct. However, this does not follow. The artistic instinct is developed by association with things artistic. The artist sees, studies, and works when he is surrounded by good examples of art. He, then, we will say, goes to work to produce something himself. He is able through his general knowledge and association with good things, to produce something which is original and good. He is not copying from one thing to another, yet he is unconsciously surrounding himself with good principles, and in an informal way he is using those principles. He is unconsciously building up good principles within himself without being able to formulate them, the same as a man may have good morals without being able to understand the science of morals. A man may understand the science and philosophy of morals and yet be a very immoral man. This principle has an all-around application.

What has all this to do with ordinary everyday brickmaking? A great deal. Ordinary everyday brickmaking will enlarge and it is a part of the business of the CLAY-WORKER to help develop it. There are few who take an interest in architecture as an art; others, though less in number, who give this interest and knowledge a practical application to their work in the yards. What is the result? Dollars. We have in mind one particular brickmaker who will get from fifty cents to a dollar a thousand, more for his brick, because he always makes not only good brick but those which look well. People go to him and want to buy front brick. He does not sell them. He says: "I will sell you front brick, but I must sell you the other brick too." Hence, he gets a good price not alone for his fronts but for others. This man likes good architecture and good buildings,—studies them, talks about them, appreciates them, is influenced by them, and that state of mind has a reflex influence on his pocket book. It enables him to sell his front bricks and every other brick that he makes, at a better price than most of his competitors. It pays to have good artistic morals as well as other morals.

It can be set down to the credit of the bicycle that it is the means of bringing about a good deal of discussion as to the

condition of the common roads in the United States. Manufacturers of bicycles, and those who use them, are interested in the question, and in addition to a good deal of verbal discussion there has been some very interesting matter printed about roads. It has been rather conclusively shown that the improvement of our highways is not so serious a matter, financially, as it has been generally considered, and the universal advantages of good roads have been brought to the front. If those whose interests in roads center mainly about the "wheel" shall bring about a much needed reform there will be good reason for blessing its inventor, whoever he may have been.—*Ex.*

Written for the Clay-Worker.

HINTS ON BRICKMAKING.

No. 65.

BY R. BRICK.

AFTER a kiln of bricks has been burned and closed up, the cooling process begins. How to properly close a kiln and how rapidly it may be cooled without injury to the bricks, is something that must be learned as well as the burning. A kiln of brick may be well burned and the ware in good condition when closed, yet if it is allowed to cool too rapidly a large percentage of the brick may be damaged in cooling. It is not possible to give directions or a formula that would suit all clays. A large kiln of bricks requires more time to cool than a smaller one. Bricks made from tenacious clays will bear more rapid cooling than will those made from sandy or short clays. Kilns 25 feet wide and set 40 courses high can in some strong, unctuous clays, be cooled in 72 hours; others in 96 hours; while some should have five days and nights, and some even six days and nights. However, to be on the safe side give your kiln ample time to become cool, especially the first kiln burned.

In closing a kiln burned in permanent walls, where they are practically air tight, in order to insure the ware cooling uniformly in every part of the kiln it is necessary to admit some air from below. This is the case in a furnace kiln especially. An opening 1x2 inches for each eye in the kiln is necessary. I think, however, where a kiln is burned in a temporary wall, it is not necessary to leave an opening at the arch, as there are always openings in the wall to furnish air necessary to replace that thrown off with escaping heat. As

the heated air rises from a cooling kiln, a vacuum is formed within the walls unless air is admitted at sides or bottom. If the walls are tight and no air is admitted the atmospheric pressure becomes so great that air will be forced downward through the platting into the kiln; this injures the brick in the top courses. If any one has any doubts about the reliability of this statement just close your arches tight when done burning (in a tight permanent wall), then the second night after closing go on top and you will find, while some parts of the kiln is still red hot, other parts are cold and black; here the air is going downward into the kiln. By admitting sufficient air from below there will be no cold spots while the kiln is hot but the top will cool uniformly.

When the first kiln is ready for shipment, ship to your patrons only good merchantable brick, as you have your reputation to establish. If there are any that have been "washed" by rain before they were set in kiln, put them aside where they will be out of the way. When the arches are reached set aside also the damaged and broken bricks with the washed bricks. All these can be utilized later in the season in building artificial dryers and permanent kilns. A large per cent. of this quality of bricks can be used in this way, and answer the purpose as well as good bricks. In this way you furnish your customers good bricks, with little loss on your part. In shipping bricks they should be graded to suit your market. Nomenclature of bricks has had the attention of an able committee, my esteemed friend Eudaly being chairman. The grades seem to differ in quality and name. These are, usually, "foundation," or "hard," "pavers," "fronts," and "salmon." Your grades will soon become familiar to your customers, then when they order bricks they will get just what they want. Filling orders promptly and properly will soon build up a reputation among builders that is of great value to the manufacturer. When brick are taken from kiln to market in wagons or carts the cheapest method is to toss the brick dried into the vehicle. If they are to be loaded on cars for shipment, wheelbarrows is the best method; roll them from the kiln directly into the car and hack them from the barrow. Where there are tracks at either end of the kiln there is no difficulty in loading one hundred thousand a day. Here the bricks should be handled with care

to avoid chipping them. They are now burned, and ordinary care will save them at this stage. Where wheelbarrows are used it is necessary to have planks to roll the barrows on, and bricks that fall from barrows should be picked up at once, and the top kept clean and level, so that the loaders can handle their barrows quickly.

Written for the Clay-Worker.

TILE ROOFS.

THE accompanying photographs describe these tiles better than words.

Fig. 1 is the top view of a tile, and Fig. 2 is the view of the under side of the same tile. Fig. 3 is the top view of another, and Fig. 4 is its bottom view.

The weight of the tile shown in Fig. 1 is 885 pounds per square. It would take 221 tiles to lay a square. It would require the same numbers of Fig. 3 to lay a square, and they would weigh 850 pounds. These tiles were purchased at Pierrefonds, a chateau town about twenty miles to the north-west of Paris in France. They are slightly different in design, though involving the same general principles of construction that

it would not be proper to state that any particular form is received with distinct marks of favor. The general excellence of tile roofing is understood throughout the old world, and while one will find a

Southern France or Spain we would find yet others; into the middle of Germany, yet another; Belgium, has a pattern of its own which is in general use. We would not say that the Holland tile for



FIG. 3.



FIG. 4.

tile like this which is common in one section, he will find in going through other parts of the country, another tile

instance, is the only one used in Holland. Quite the contrary, but it is the one most in use. The people of Holland think the one which we have mentioned is altogether the best. The people of the middle of France at this time favor the tile which we illustrate directly in connection with this article. In Germany we find the people disposed to another form; Belgium another, and so on. All this is significant. It indicates that tile roofs on general principles, irrespective of the particular character of the design are regarded with favor wherever they are used, and hence it is altogether improper and unjust to say that one tile or another tile is the best. We have evidence that different styles and different patterns and altogether different forms of construction are applied to tile roofs, and that in the different sections they are received with a uniformity of favor, than which there can be no better evidence of the value and usefulness of tile as a roof covering.

The CLAY-WORKER has presented evidence that there are many different designs and patterns which may be used and used successfully, which means that there is an opening for the investment of capital, which is broad and which must, if it be properly handled, result profitably to those interested. There is no field more open, none which would be accepted more readily by the public, and none in which there is less chance of failure. Surely the field of the clayworkers is broad.

LOUIS H. GIBSON.



FIG. 1.



FIG. 2.

is common throughout the middle of France. They illustrate the general style of construction and design that is represented by the modern tile pattern in that section of the country. Not but that one will see others. Plain shingle tiles and various other designs which have been previously illustrated in the CLAY-WORKER, yet these are representative of the modern French tile, which are most in use to-day. However,

of entirely distinct construction, different in form, manner of laying and all that, which is received with quite as great favor. In truth, one might be able to locate himself in traveling through Europe, by the roofs, if he were acquainted with the style of tile roofing which belongs to one section or another.

In our illustration on the first page, there is shown a tile which is common in Holland. If we were to go into

Written for the Clay-Worker.

PRACTICAL POINTS ABOUT PAVING BRICK.

Third Paper.

THE MACHINE.



SUBJECT of machines is generally considered a delicate one by writers on subjects pertaining to clayworking. It is either feared that they will be accused of free advertising, or their native kind-heartedness holds them in check lest they should tread upon somebody's toes. This is all wrong. There doubtless is, and certainly should be, a kindly feeling between the clayworkers and the manufacturers of clayworking machinery, but we are all human, and "to err is human." We probably all are familiar with cases where an inferior, incompetent or impractical machine has been sold to some honest, trusting clayworker by an oily-tongued agent.

The consequences were that the machine not only cost the purchaser the price paid for it, but it lost him much money by its inability to perform the work which he required of it. Its failings were manifested in breakages, lost time, inferior products and, last but not least, lost opportunities in which a good machine would have been making money for its owner.

Political papers laud the good qualities of candidates for public favor or warn voters against the one who is incompetent or unworthy. Agricultural papers recommend those things which have been shown by experience, or otherwise, to be worthy of adoption or, at least, worthy of investigation, at and they condemn the "Sundry humbugs" that may be likely to prove an injury to the readers. Shall the pen of editor, contributor or correspondent of the periodical of the clayworkers be silent lest they injure the business of some paying advertiser? "Let every tub stand on its own bottom." Let every machine be sold for the purpose for which it is adapted.

It is no more likely that the same machine will make first-class brick, both building and paving, paving blocks, drain tile, roofing tile, terra cotta lumber, sewer pipe, clay fence posts, well brick, and railroad ballast and make them all successfully, and profitably, than that some Yankee invention, called a washing machine will give satisfaction as a cream separator, churn, butter

worker, bread mixer, portable bath tub, feed cooker, incubator, and baby spanker.

We have seen factories with the remains of several different machines scattered about, while the proprietor was struggling with latest purchase and fearing least it would kick back, explode or perpetrate some treachery upon him. Fortunately he had not yet been compelled to pay for them all and yet the specter of a lawsuit for the purchase money lurked near him and like Banquo's Ghost would not down so long as the mortal remains of the machine that the wiley, or lie-by agent had recommended as unique, peerless, excelsior, E Pluribus Unum, Yankee Doodle, whoop! *ad-infinitum*, *ad-nauseam* was there to haunt him with its hated presence.

So much by way of preface to a very few thoughts upon the subject of machines for making paving brick. The main idea that we were preparing for in the preface is, that all classes of clay working machines are not adapted to the manufacture of paving brick from any and all clays, simply because they are clayworking machines, and paving brick are made of clay.

We stated in the beginning that a paving brick should be homogeneous and dense.

We believe that these conditions are best secured by the class of machines known as the stiff mud, plastic clay or wire cut machines.

Clays that are pugged have a distinct fiber or grain that materially adds to the strength of the brick. Just how this grain comes might be a little hard to explain, but the fact of its existence is recognized by all. Probably it is due to the arranging longitudinally and parallel of the particles of the clay by the knives or blades of the pug mill. This arrangement of the longer axes of the particles in parallel lines and the consequent overlapping or breaking joints of the particles is not unlike the arrangement of the fibers that make up a thread, cord or rope. Again, this parallel arrangement of the particles permits of their being compressed into the smallest possible space; that means making the brick more dense or getting the largest amount of clay into the space allotted to a brick.

There are two advantages to be gained from this. One is the greater density or strength of the brick, which results from the fact of its having the greatest

possible amount of material in its composition, and the other is to be derived from the arrangement of the particles of different kinds that constitute the clay being thoroughly pugged, finely divided and uniformly or homogeneously mixed, and brought closely together and in the best possible positions to act upon each other, either mechanically or chemically under the changing influences of the heat of the kiln.

The fluidity or plasticity of most clays greatly facilitates the compression and condensation which is so desirable by allowing the particles to flow or move past each other and assume positions close together under the pressure of the machine.

Soft mud brick, other things being equal, cannot be compressed as effectually nor made as dense as stiff mud brick and will shrink more in drying.

Dry press machines, which use a granulated clay, do not produce the fibrous condition found in semi-dry brick. The clay being delivered to the mold in a loose state, has nothing to arrange the particles with their longest axes parallel.

The promiscuous condition is not the best for close contact of the particles. The great pressure used in forming dry press brick compresses the loose clay and makes the brick dense, but reason teaches that the particles are still in positions that retain small spaces between.

Close contact very much facilitates chemical action and mechanical union in the kiln.

The tendency of dry pressed brick is to be granulated after burning.

Unless the clay contains some ingredients that will fuse and cement the granules together and run into and fill the interstices, the granulation will necessarily remain in the brick after burning. From this it appears that the success of dry pressed brickmaking depends largely upon the existence in the clay of a sufficient amount of fusible material to thoroughly unite the particles or granules of the clay.

Although it may seem a statement too simple to make, all do not seem to realize that the different kinds of brick machines are only adapted to and will only give satisfaction in working the special kind of clay for which they were designed. Evidently a soft mud machine will not make brick of the clay used in dry press machines, and *vice-versa*. Yet instances are not rare

in which men have lost time and money by trying to make brick of their clay with machines that were not intended by their designers for this class of clays.

To those who are seeking machinery to work particular clays we would suggest that they first ascertain by what process their clay will work most successfully; that is, to which process, soft mud, semi-dry, or dry press their clay is best adapted. They might then learn what particular machines are working satisfactorily in clays similar to their own.

Let them investigate for themselves, and after giving a due amount of time and study to the subject, act upon their own judgement.

If it is made known that they are wanting machinery, they will doubtless be waited upon by agents of responsible firms who will readily give good guarantees, and are amply able and fully willing to make their guarantees good, but the agent may not be a good judge of clays and may not understand the peculiarities of the clay to be worked. He may be willing to put his machine in on trial, but this trial is an experiment and the proprietor of the plant has no desire nor time for experiments. While the guarantee may be made good it will not compensate for the time and money lost in experimenting.

It is much better to spend considerable time and money in visiting manufactories where similar clays are being worked, than to hastily begin with a machine that is not known to succeed in the particular class of clays under consideration, although it may be completely blanketed by guarantees.

After investigation has pointed out the particular machine that is most likely to give satisfaction it will be time to begin with this machine and its guarantees.

Written for the Clay-Worker.

THE BRICKMAKER'S TRIALS.

No. 1.

SELLING BY SAMPLE.

LIFE'S disappointments are many and bitter. Blaine's sure grasp upon the nomination is appropriated by Harrison, and the tail of Tammany's tiger is twisted by Cleveland. Most of us in the world become a source of disappointment to others or ourselves, and the brickmaker generally fills both bills. As chief among his tendencies

for evil, he finds three, and which are the disappointments he gives his creditors, his contractors and himself.

His creditor knows no rest because (from him) he knows no pay. His contractor is filled with wrath, because he has been filled with poor brick, and his own heart is never satisfied, because he can never find samples good enough to represent his stock on hand.

Perhaps the cloud of doubt on the horizon of the creditors mind will roll away some day, and the wrath of the contractor will abate when he is sadly in need of brick, but the brickmaker, ——! Ah well! "In the sweet by and by" when we demand of St. Peter the opening of the "Pearly Gates," he will point in, to many brick piled against them and they will be a weight which we may never be able to move. When told that they are the gathered samples of all we sent when upon earth, and we examine them under the search light of eternity, it will be no wonder if we deny having ever seen them before, for they will surely appear to us vastly different from what they did when upon earth.

It is said that St. Peter at the gate, is very ready to listen to the excuses of erring mortals, and for some time we have been preparing ours, and which will be something after this-wise: Good St. Peter we confess our sins, and beseech thy leniency because thou knowest how many upon earth seem the trials of the brickmaker. Troubles and disappointments ever followed us from the pit to the palace; "From the cradle to the grave;" sand in the machine when we needed clay, and clay when we needed sand; too little water with which to temper the clay, and too much water when we wanted to dry the brick; never a setter but what was careless, and never a burner but what was sleepy; if good brick were placed in the kiln, poor ones were sure to come out, and if bad brick were sent to market, the drayman made them look worse by hacking the worst side up. Good St. Peter, again we confess our sins and acknowledge that poor brick followed good samples, yet we pray thee to remember that it were an easy matter to pick out a few samples and a herculean task to find a stock of good brick.

If St. Peter will not listen to us,—well, we'll go back to earth and arbitrate the matter before a lot of brickmakers for judges.

Seriously, fellow craftsmen is not the

getting out of samples one of the inventions of the devil wherewith he expects to catch us all and eventually burn us into poor brick.

Before me lies a letter which is representative of its class:

Providence, R. I., June 20, '92.

MESSRS. PERFECTION BRICK Co.,

Quick Sand Swamp, R. I.

Gentlemen:—Please send us (express prepaid) six samples of your very best building brick. We are in the market for one million and which are to be used in erecting a building whose specifications debar arch and salmon. Our bid for the work being very low we must purchase our brick cheap, and we will run in all light grade and black ends possible. Yours Truly,

THE HONEST CONSTRUCTION Co.

No one but a hardened "Drummer," possessing a cast-iron conscience, could be found who would be able to pick out samples that would win the order without winning the smile of his satanic majesty.

Why; says the honest mortal, send honest samples and trust the city engineer's experience with brick to realize that they are not all perfect. Well my friend that is what we did do when we picked out the first lot of samples ourselves, and we kept a clear conscience and also kept our sewer brick. We also still keep a letter on file which states that the order was given to the Hard to Beat Brick Co., because the samples received from them were of a much better quality. We personally endeavored to get out just one other lot of samples, and when after a two hours search, we were starting for the office with the selection we had made, we heard a voice around the corner make the remark to write them, *we were sending all we had of that kind*. Since that time we have been looking for a sample clerk. Our requirements of such a man is, that he shall be able to find good brick where only poor ones abound, and have the power to make the contractor believe that the stock sent is a hundred fold better than the representing samples. Such a man is sure of good pay and a permanent position with the Perfection Brick Co. while it is in existence.

J. A. S.

Edith.—"Johnny, is your new baby sister a blonde or a brunette?"

Johnny.—"Well, I haven't had a good look at it yet, but judging from her voice, should think her something of a yellor."



I'M a decorated tile, but I'm lonesome. You would be too, if you were in my place. Just think of it! Entirely separated from my family and serving as an umbrella-holder for a crazy artist. Bah! Not that I ever heard any one call him crazy, but I have my own opinion of a man that

would deliberately steal a tile, ruthlessly tear it from its proper sphere in life and force it to assume a state entirely foreign to its nature!

He did steal me, for I heard him tell his wife so, that dark night when he brought me into the house, and it's a very mean man that will do something wrong and then brag about it. I burned with indignation just to hear him talk. My friends, I suppose, will forever consider me a deserter from their army. Indeed I can scarcely command myself, even yet, when I think of the indignities heaped upon me. I, who look upon the whole Tile family as the especial benefactors of our country, and just imagine if you can what would the world be without us and our relatives—the Brick!

How well I remember the last few days I spent with my companions. We were encamped along the entire side of the street, the trenches were wide and deep; we were to resume the march on the morrow and hoped very soon to be ready to carry away all that was offensive to our fair city.

The day had been damp, the atmosphere oppressive and as night drew on, a feeling of sadness crept over me and I felt impressed that all was not well. Suddenly I heard a footstep, and then an exclamation, "Ah!" and I felt myself siezed, bound and being carried rapidly from the camp. I tried to call, to summon assistance, to arouse the guard, but alas, my voice was hollow and unnatural and brought me no help. No one could describe my feelings unless it would be Charlie Ross.

After some days I did try to con-

sole myself with the thought that being brought into the close companionship of an artist and his family, I might perhaps learn something of the art of deco-



ration, which, if I ever made my escape and reached the dear ones at home, might prove of interest to the Tile family generally. So I resolved mentally to learn all I could, and as "eternal vigilance is the price of liberty," to watch



and hope for a proper opportunity to leave. But this was before I knew what the artist wanted of me, but in a very short time I was made to realize the fate awaiting me. He and his wife came into my room one morning and as they entered I heard him say, "You will see,

after I give it two good coats of black paint and then decorate it, you will be proud of your umbrella stand. It will be unique to say the least of it." I did not thank him for calling me "it" and I hoped that I would be so ugly when he finished decorating me that his wife would toss me into the street, and I intended to do all that I could to resist the paint, and should act up real rough about it. The fight continued some days but all to no purpose, he only put on the third coat of paint and then took out his gilding. I had heard of "The Gilded Age" before but I did not know that a stork was considered ornamental. I would call it awkward, myself, but I heard the artist call his wife "to come and see how gracefully the stork was holding up his leg." She went into raptures over it and said that "a gilded stork was so asthetic," and so they put me in an iron plate and carried me to the hall where I have been the admired of all admirers ever since. There I have been day after day, sometimes taken out to the porch on weekly sweeping days or during the periodical house cleaning.

Previous to my imprisonment here, my imagination had pictured an artist as refined and ethereal but if you could hear him give his wife his orders for dinner as he bids her good by, you would know that an artist cared for the creatures comforts just as any other man. His wife has a great deal to contend with from her callers; they always re-

serve the choice bit of gossip until she bids them good day and opens the door for them to pass out. Many a time I have seen her standing on the threshold listening to a thrilling tale when I knew she was shivering both mentally and physically. Ah me!

Time goes by on heavy laden wings.
I'm sad and I'm hopeless. Occasionally I
get a glimpse of the outside world
through the open door but the view is
limited and I pass away many long,
weary days in imagining the new hon-
ors and dignities that have fallen on our
people.

I've a cousin 'neath a hill,
Whence a rippling lispings rill,
Begins a journey to a river broad and deep;
And from her terra cotta lips,
Cold and crystal water drips,
And slakes the thirst of Farmer Hayseed's
kine and sheep.

But she is not alone,
For the farmer's not a drone,
But has planted sense and tile beneath the soil;
Raised his land out of the wet,
And freed himself out of debt,
And reaps reward in dollars for his toil.

There are others, on the square,
Who have the nerve to dare
To climb upon each other's shoulders to the top
Of a city house brick flue,
Though I think the custom's new,
And much later than the stick and clay epoch.

There's a colony of kin,
Who have replaced the tin,
Where'er the roofs of modern churches rise;
Their granite souls are stirred
As songs of praise are heard
Ascending to the blue and vaulted skies.

I'm a decorated tile,
And maybe in the style,
But I long for the friends of my youth;
In solemn meditation,
I ponder on my nation,
Its strength, its pride and its truth.

Written for the Clay-Worker.

BRICK KILNS—THE THEORY OF THEIR ACTIONS AS TO THEIR EFFICIENCY AND ECONOMY.

BY J. W. CRARY, SR.

THE superlative degree of compar-
ison is used by nearly all adver-
tisers, to distinguish the superiority
of what they have to sell, from all other
competing articles in the same time.
This is disgustingly common with mer-
cantile dealers, traders' and shop
keepers, and it is amusingly
noticeable in that old dignified matter
of fact leading clay journal—The CLAY-
WORKER.

I have looked all over, through and
through the CLAY-WORKER, to find a
"good" brick machine, dryer, or kiln,
and I find very few. There are some
"better" ones mentioned, but the "best"
is with the big majority. It is certainly
a conclusive evidence of the great and
almost marvelous progress of the clay-
working craft. I like to see clayworkers,
and especially brickmakers, start out on
the *superlative* line; the *positive* and the
comparative, was as high in degree as the

old "mud larks" of sixty years ago, ever
aspired to. I am glad to see our young
fellows billed in good style for the
superlative.

Let us try and see if we can talk brick kiln.

I will not undertake to say what in-
ventor in the market has the best brick
kiln, and while I think some are better
than others, I cannot consistently specify
a preference for any particularly named
kiln in the CLAY-WORKER, nor can I
talk *smart* or learnedly about any of the
various kilns, whose merits are so well
and handsomely illustrated in the CLAY-
WORKER.

*"The down, and the up and down draft
kilns."*

I think I know what draft means,
either up or down, but if I am asked
which will produce the most heat, and
distribute it best by the combustion of
a given amount of fuel, I must confess
that I am green, and answer: I 'don't
know. I have looked in vain for a
scientific explanation of the difference
in economy between up and down draft,
and it seems to me like going up the
front hall steps, to get through the hall
to the back yard. It is claimed that
there is a more equal distribution of
heat, but the reason or science of this
is not given. It is claimed that the top
of the kiln is hard brick. Does it not
seem to follow then, that the bottom of
the kiln with down draft, having the
same relation to heat that the top of an
up draft kiln has, would be
salmon brick. As most people think,
top of up draft kilns must necessarily
be salmon.

Again, it is claimed that "water smok-
ing" is more natural and perfect with
the down draft kiln, but no reason is
given for this claim. Perhaps the best
and safest reason is in the occultness of
the thing. It's a good thing to say,
"There is no bottom," when your sound-
ing line is short.

*Let us set up two little experimental kilns
and look right fair and square at
their operation.*

I will put these kilns side by side
each shall hold twenty thousand brick.
I will arrange one for down draft and
the other as common for up draft. Now
I will set fire to both at the same time,
burn them until I know that they are
well burned, keeping an exact account
of the fuel and labor used for each
respectively.

Now, if the brick are burned equally
well in both kilns, and one has taken
more fuel than the other, it is perfectly

clear and conclusive that the kiln tak-
ing the least fuel (for the labor is not
the factor to be much considered,) is the
best kiln.

Now, we will suppose that a scientific
man, a chemist (even our friend Wap-
lington might do,) was to come around
to see our little kilns while burning, (of
course we must have furnace and draft
all right,) he looks into the furnaces
and arch of our up draft kiln, he sees
that the combustion of fuel is as near
perfect as we can get it. The arch is as hot
as the clay will stand without melting, and
the fire is coming out in jet blazes all
over the top, and the kiln begins to
"settle," if the clay shrinks in burning
and our friend Chemist says: "That
looks beautiful, the combustion of your
fuel is excellent, and the heat by a nat-
ural draft, is economically distributed
and passes up through your kiln." Now
you show him the top of your kiln, and
he says: "I see that the blazes and
heat are stronger in some points than
in others of your kiln, how do you reg-
ulate that?" You say, "well now you see
that strong, bright, nearly smokeless
blaze in the middle of the kiln, that
spot is burned, the kiln has settled a
little there, and I don't waste any more
heat at that point." Just then a man
comes to top of kiln, with a bag of fine
damp clay, you take it and throw the
clay on the burned spot, spreading it
with your foot, so as to choke the hot
blazes; closing the spaces between the
plating. Your friend Chemist, watches
the process, and after you have covered
all the spots burned, he says: "Now
tell me why you cover certain parts of
your kiln while burning?" You an-
swer, "I finally cover the whole kiln while
burning, for three reasons. First,—when
the heat is great in the body of the kiln,
and certain parts of it are fully satur-
ated with heat, of course, such parts
are burned, and the further expenditure
of heat at these burned parts is
not only a loss of fuel and labor, but
prevents the necessary distribution of
heat to the unburned parts of the kiln;
so I cut off the draft of useless heat, and
thus force the draft to parts needing
more heat. Second,—This process of
covering enables me to perfectly control
the fire in the furnaces and arches with-
out any change in the mode of firing.
I keep my furnaces and arches uniformly
hot without change of fires. The process
of covering also diminishes the consump-
tion of fuel, nearly in proportion to the
amount covered. Radiation of heat

from outside of kiln excepted. You see, the covering of kiln is continued, as parts of it are burned until the entire kiln is covered. This equalizes the heat from bottom to top, and the second course from the top is almost as hard as any brick in the kiln. Another and very important result is had from covering a kiln; after it is closed, it cools off very slow. The heat is retained in the brick until the clay is annealed, and there are no imperceptible fractures in the brick, as there will be, when the heat is allowed to escape from top, as in the common way, when a kiln is not well covered.

"Some burners try to close up platting so as to prevent the waste of heat, but it is a hot, difficult job, and if done is very imperfect."

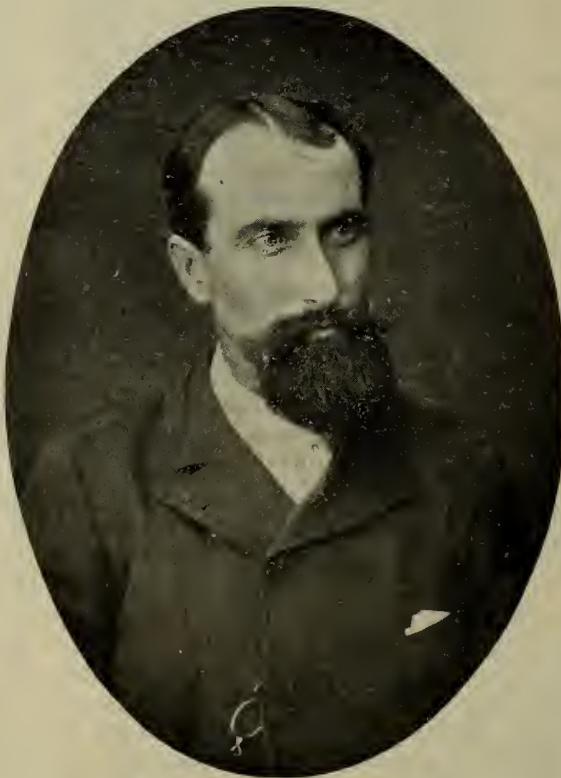
Our friend Chemist, listened with much interest, and then said; "I cannot see that science or art could improve on your process of burning brick. You certainly have reached the 'ultimathule,' (the best) in the art of perfect burning, so far as principle is concerned."

I then showed him the down draft kiln. It was working at its best, the draft good, and the combustion of fuel was equal to that in the up draft kiln, but there was no easy and true way of ascertaining the condition of heat in the kiln, and the draft and fire had to be changed occasionally so as to control and direct the heat, and while both kilns had the same attention, the down draft kiln was more difficult to manage, consumed as much fuel or more and had not progressed in burning as fast as its side by side competitor.

I then asked my friend Chemist, to express his opinion as to the relative merits of the two kilns. He said: "I have no practical knowledge of brick kilns or burning. I can only judge of the theory and success of the art as I see it practiced. I can see no possible gain in going to the expense and trouble of creating a draft sufficient to carry a flame to the top of a kiln, in order to force it down back to the bottom of the kiln; when if the flame had been made and introduced into the fire arch, as you have it in the up draft kiln, the heat would naturally ascend, and under control, as you have it, by covering the burned places with clay, the diffusion and distribution of heat, is more natural and more easily controlled."

I thanked my scientific friend for his disinterested, candid opinion, and like him, I have no wish or interest in disparaging any of the so-called best brick kilns. It can be proved by a fair test, that a "down draft" or "up and down draft" kiln is better and more economical than an open top, up draft kiln. I shall be glad to see and acknowledge the improvement. Perfect combustion of fuel and perfect saturation of a kiln with heat, at the least cost, is what we want.

THERE are some things that give a mechanic "that tired feeling," and among these one of the greatest is the fact that, every time a machine of any



MR. C. J. C. NOEL, SECRETARY AND GENERAL MANAGER OF THE CLEVELAND FIRE BRICK CO., CLEVELAND, TENN.

kind that has not heretofore been connected by a belt with a shaft driven by an electric motor is so connected and so driven, we must have a new account in detail of this latest "victory of electricity," and be told over again how it has once more supplanted the steam engine, the very same article often going on to say that the dynamos are driven by "horizontal compound boilers and engines." How long will it be, we wonder, before the ordinary newspaper man will come to understand that dynamos generate no power, that electrical apparatus is simply a means of transforming and transmitting energy developed by some other prime motor, usually an engine? And

why must we hear all about it every time some farmer runs his barn machinery, for grinding feed, etc., by a motor which derives its energy from an engine, and have it heralded as another victory for the electric motor?—*American Machinist*.

THE CLEVELAND FIRE BRICK CO.

THE Cleveland Fire Brick Works, Cleveland, Tenn., of which a photo sketch is shown on the following page, were first established in 1886, by George Carlyle & Sons, of Steubenville, Ohio, who, a year later, sold out to Messrs. Noel & Macquillan, and, in 1889, they in connection with Mr. J. H. Sanborn, of St. Louis, took a charter of incorporation and formed the Cleveland Fire Brick Co., now well known all through the Southern States. Their plant was a success from the start and in 1890 and '91 was enlarged and much improved. It is admirably situated on the main line of the E. T. Va. & Ga. Ry., and on the famous Cleveland fire clay beds now owned and operated by their Company.

They have put their whole energy and skill in making as good a fire brick as could be made in the South and conducted their business safely and honestly throughout these hard times; their output is yet small compared with the large plants of Ohio, Mt. Savage, or St. Louis, but now that they have solved the difficult problem of making a good refractory brick in Dixie, the works will be much enlarged this year and next, and they will make furnace blocks, locomotive tiles and probably gas retorts, in fact it will be a first-class fire brick plant in every particular.

Mr. C. J. C. Noel, the Secretary and General Manager of the Company is a hard working Frenchman and clay-worker, who came to this country when quite a boy and made his way by his energy and close attention to business. Through his influence he has lately interested some French capitalists in his Company. They bought out Mr. Sanborn, who retires from business, and the plans of the new stockholders are, to have the Cleveland Fire Brick Company the best equipped fire brick plant south of the Ohio River.

Written for the Clay-Worker.

CHEMISTRY FOR CLAYWORKERS.

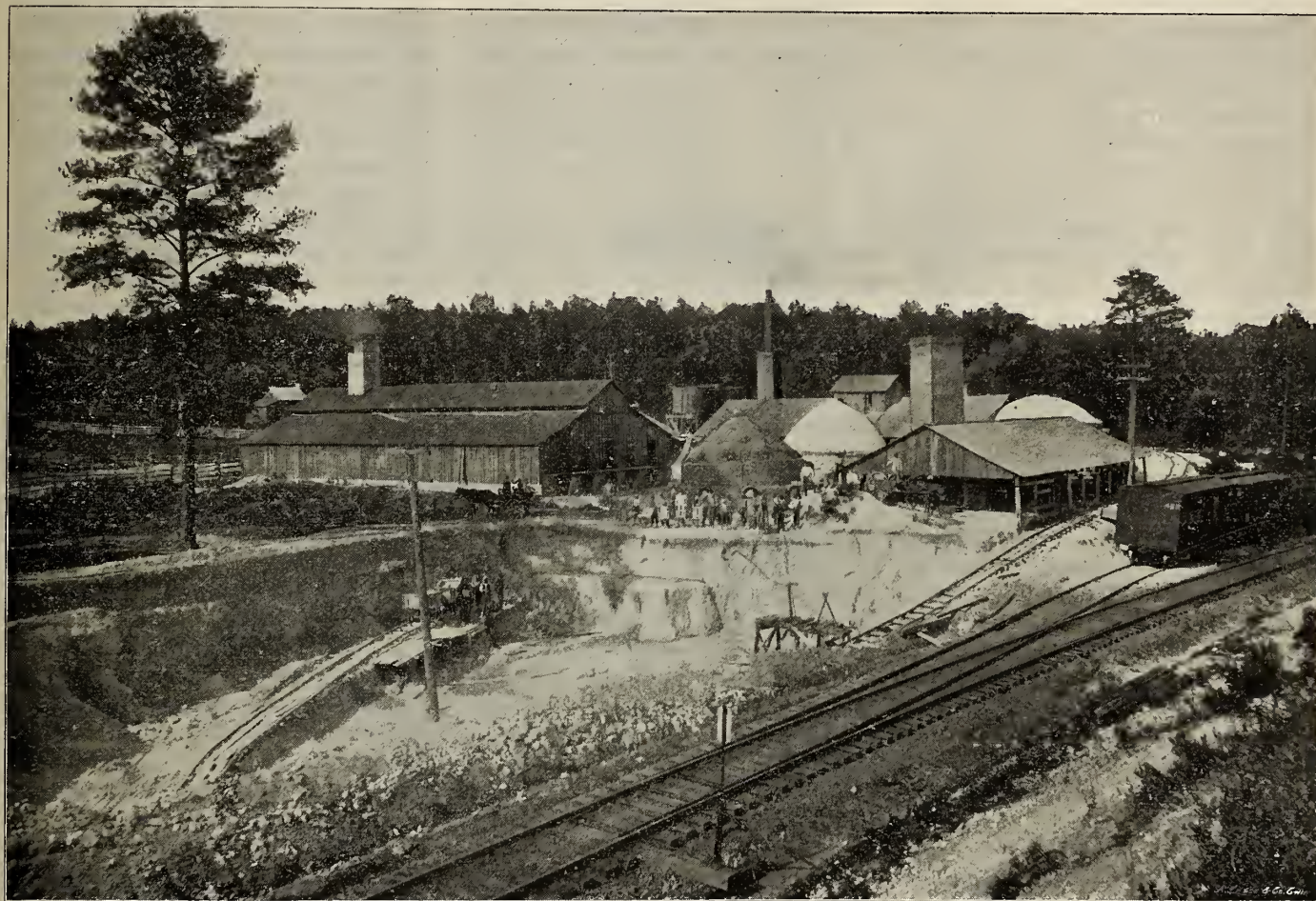
Paper No. 3.

PROCEEDING now with the laws of combining proportion, we arrive at the second law, which is usually called the law of *multiple proportion*, and is thus stated:

When a body combines with another in several proportions, the higher proportions are always multiples of the first or lowest combinations.

and carbonic acid—readers of the CLAY-WORKER must, by this time, be quite familiar with these two gases. Again hydrogen combines with carbon in several proportions, but they obey the law, and we find that all the higher combinations are multiples of the lowest—combinations of hydrogen and carbon are called hydro-carbons—marsh gas, also called *fire-damp* by miners, is one of these hydro carbons. I must ask the readers of these articles to make a correction or two: Marsh gas is represented in the June number as $H_4 C_4$;

distillation of the coal; they are both as transparent as the air you breathe when pure. I will only say that the first mentioned hydro-carbon, marsh gas, or fire-damp, is also called light carburetted hydrogen, and then continue the illustrations of the law of multiple proportions. Oxygen combines with nitrogen in five different proportions, but you will presently see that all the five are multiples of the first. Oxygen and sulphur also combine in more than one proportion, but adhere strictly to the law. I might fill many pages of the



WORKS OF THE CLEVELAND FIRE BRICK CO., CLEVELAND, TENN.

This law may be illustrated from the list of compounds given in my last paper. Take water for instance; H_2O it combines with another atom of oxygen forming H_2O_2 , or, instead of the ordinary 16 parts by weight of O to the 2 parts of H, there will be 32 parts of O to the 2 parts of H, it is then per oxide of hydrogen, or oxygenated water, with still a more modern name. Again, carbon combines with oxygen, or rather let us say that oxygen combines with carbon in two proportions, forming the well known gases, carbonic oxide

it should have been CH_4 , and the atomic weight should be $12+4=16$. The table, also, of non-metallic elements in the May number contains two errors. The symbol for silicon is Si, not Se, and the symbol for selenium is Se, not Sc.

Returning now to the hydro-carbons, of which we shall only mention another at present; this is olefiant gas, or heavy carburetted hydrogen; these two are the chief constituents of illuminating gas made from bituminous coal; the olefiant gas furnishing nearly all the light; they are produced by destructive

CLAY-WORKER with similar examples; in fact every element and every compound corroborates this law in a surprising degree. I may state that sulphur and oxygen are known to combine in seven different proportions; only two of these will be given this time, because they are substances with which you are somewhat familiar; the other five, at least four out of the five, are not so well known, and so far they do not serve any useful purpose in the industrial or art world, but without doubt they will some day. We will now symbolize

and tabulate the compounds mentioned above; you will then see at a glance multiple proportions exemplified, and to make it plainer we will assume that the atom of hydrogen weighs an ounce, and the other atomic weights in ounces also:

H ₂ O Water then	is a combination	of H 2 oz and O 16 oz=	2+16=	18 oz.
H ₂ O ₂ Oxygenated water	"	" H 2 oz " O 32 oz=	2+32=	34 oz.
C O Carbonic Oxide	"	" C 12 oz " O 16 oz=	12+16=	28 oz.
C O ₂ Carbonic Acid	"	" C 12 oz " O 32 oz=	12+32=	44 oz.
C H ₄ Marsh Gas	"	" C 12 oz " H 4 oz=	12+4=	16 oz.
C ₂ H ₄ Olefiant Gas	"	" C 24 oz " H 4 oz=	24+4=	28 oz.
N ₂ O Laughing Gas	"	" N 28 oz " O 16 oz=	28+16=	44 oz.
N ₂ O ₂ Nitric Oxide	"	" N 28 oz " O 32 oz=	28+32=	60 oz.
N ₂ O ₃ Nitrous Acid	"	" N 28 oz " O 48 oz=	28+48=	76 oz.
N ₂ O ₄ Hyponitric Acid	"	" N 28 oz " O 64 oz=	28+64=	92 oz.
N ₂ O ₅ Nitric Acid	"	" N 28 oz " O 80 oz=	28+80=	108 oz.
S O ₂ Sulphurous Acid	"	" S 32 oz " O 32 oz=	32+32=	64 oz.
S O ₃ Sulphuric Acid	"	" S 32 oz " O 48 oz=	32+48=	80 oz.

You will easily perceive that the oxygen moves in sixteens, and if we continue our assumption of the hydrogen atom weighing one ounce the oxygen atom will weigh one pound, and we can not fail to be struck with the persistence with which oxygen sticks to the level pound, or pounds, as the case may be, look at its combinations with nitrogen, and we find that 1 $\frac{3}{4}$ lbs. nitrogen combines with 1, 2, 3, 4 and 5 lbs. of oxygen respectively. You will also observe that it makes no difference by combining with some of the other elements; look at its combination with hydrogen, and carbon, and sulphur; there it is, always the even pound, never a fraction under or over; if it cannot combine in even pounds, it will not combine at all, and this holds good for every known compound of oxygen; moreover, what has been said of oxygen may be said of all the other elements; they will only combine in the proportion of their atomic numbers, or some multiple of them. This is fully proved in practice, and establishes the above stated law of multiple proportion.

By this time you are beginning to be acquainted with some of the compounds in a chemical sense. You have known some of them in a general way for years, may be; water for instance; what a common substance, and how universally known, yet how little we know about it. Until 1781 water was considered an element, when Mr. Cavendish demonstrated its composition, and it is said Mr. James Watt made the discovery simultaneously, or nearly so. Mr. Cavendish gets the credit of it, how-

ever, and the discovery made then completely upset the prevailing notions of chemistry in vogue at that date. Dr. Priestly, of England, and Scheele, of Sweden, both discovered oxygen in 1774, and same as Cavendish and Watt, independently of each other. The name

oxygen was given to it by Lavoisier some years after its discovery, and is derived from the Greek words, one signifying *acid*, and the other *I give rise to*, or in plain English, *I form acids*. This being the view of Lavoisier and his contemporaries, I must not, however, wander away from my subject so far. I will merely remark that oxygen is not considered the acid former now.

My object just now is to make you more fully acquainted with some of the compounds given above and to show you that the law of multiple proportions applies equally well to combinations of compounds with compounds; take carbonic acid for instance, and its combinations with lime, soda and magnesia; these are substances with which you are familiar—as I said above—in a general way. Now, chemically speaking, lime, quick lime, or unslacked lime, as we call it, is an oxide of a metal called *calcium*, and similarly soda and magnesia are each oxides of the metals *sodium* and *magnesium*; and since an oxide is a combination of oxygen with another body, it follows that lime, soda and magnesia are each compounds, and their combination with carbonic acid is the combination of a compound with a compound.

It may be somewhat premature to be treating of such compounds before I have introduced you to all the elements, but the substances are such common, every-day articles, and they will serve to illustrate very well the law under consideration, that I think it will do no harm to run ahead a little sometimes, even if we have to come back again.

The metal calcium has an atomic weight of forty and its symbol is Ca; the symbol for sodium is Na, and its atomic weight is 23 (sodium takes its symbol from its Latin name, *natrium*). Magnesium is symbolized by Mg, and its atomic weight is 24.5. The symbols and atomic weights of the oxides are as follows: Ca O=40+16=56; Na O=23+16=39, and Mg O=24.5+16=40.5. Now each of these oxides will combine with an atom of carbonic acid and form respectively carbonate of lime thus Ca O+C O₂=Ca C O₃; this last is the symbol for carbonate of lime, and its atomic weight is 40+12+48=100. I have told you before that carbonate of lime is marble, limestone, chalk, etc., and its equation, or symbol either, shows you its composition when pure, viz., in 100 lbs. there would be 40 lbs. calcium, 12 lbs. carbon and 48 lbs. oxygen. Remember next time you handle a piece of chalk, or marble, or limestone that 48 parts in 100 of that chalk is oxygen gas, and try to calculate the amount of pressure it took to condense it into so small a volume.

The next is soda Na O; now this is not the washing soda of the shops, but will be when combined with carbonic acid, thus Na₂ O+C O₂=Na₂ C O₃; now this is washing soda without its water of crystallization, or washing soda with its water dried out, which you may do by laying it on a hot stove; it will boil and finally settle down to a small quantity of white powder. The regular washing soda contains ten atoms of water for each atom of the carbonate, and is symbolized thus, Na₂ C O₃, 10 H₂ O. If you will treat this equation same as I did carbonate of lime you will find that when you buy a pound of washing soda you get about 6 oz. of carbonate of soda and 10 oz. of water, or in per centages, 37.1 soda, and 62.9 water.

My main object in bringing soda into this illustration is to show the adherence to multiple proportions when compounds combine with each other in more than one proportion, which is the case with soda; it combines with one atom of carbonic acid to form the carbonate just mentioned, and it combines with two atoms of carbonic acid to form the bi-carbonate; this is what you buy at the druggist's to make effervescing drinks, etc., and may be symbolized thus, Na₂ O+H₂ O+2 C O₂=Na₂ H₂ 2 C O₃, but is usually represented by half of this formula, then we find it reduced to Na H C O₃. You may not

be able to understand this very well just now, so let it pass for the present, suffice it to say the prefixes, bi, bin, or di, mean twice or double, so that bi-carbonate of soda means the double carbonate, that is, it contains two atoms of carbonic acid, whereas the carbonate contains only one atom.

Magnesia is the next substance, commonly known in the shops as calcined magnesia; its chemical name is oxide of magnesia, its symbol being $Mg\ O$, and this oxide, by combining with carbonic acid, forms the carbonate of magnesia, $Mg\ C\ O_3$. This carbonate is difficult to make artificially, but exists abundantly in nature, and is generally associated with carbonate of lime in the form of dolomite, commonly called magnesian limestone.

I am going out of course, I know, but I cannot refrain from mentioning another compound of magnesia, that is the sulphate, which is so well known as "Epsom salts," and very easily made by pouring sulphuric acid on the carbonate of magnesia; the carbonic acid vacates the premises as quickly as possible and the sulphuric acid occupies them just as quickly, the carbonic acid is set free, and the sulphuric acid is imprisoned within the magnesian walls.

You will, no doubt, have noticed that the carbonate of lime, soda and magnesia are all formed by the same quantity of carbonic acid; that 23 oz. of soda, or rather 44 oz. of carbonic acid just as much as 39 oz. of oxide of sodium require 56 oz. of oxide of calcium require it. All the elements require just the same amount to form their carbonates, no matter how high or low their own atomic weights may be; thus lead, with an atomic weight of 207, requires no more carbonic acid to form its carbonate than lithium, with an atomic weight of only 7; and the same may be said of all the bi-carbonates, sulphates, chlorates, etc. This constancy of composition gives to chemistry the charm of reliability, besides simplifying the science and reducing it to definite laws easily understood and remembered.

I ought, by all means to have furnished you with the remainder of the elements which are all metallic, but I cannot do so in this letter; in my next you may look for it and the other two

laws of combining proportions, also something more on chemical notation and nomenclature.

W. WAPLINGTON.

BRICKMAKERS AND THEIR PECULIARITIES.

Some of the Innerworkings of the New York Market.

WHEN reading Mr. Crary's article in your May number the thought came to me, can it be that the brickmakers are, as a class "peculiar." As one thinks the matter over, it does seem that he is right, that the contact with the brick cause all who



C. H. HORTON, SUPT. WELLINGTON (O.) MACHINE CO.

come in contact with them to become a "peculiar people."

A gentleman last season informed me of his experience in answer to an advertisement for a foreman. I did not think much about it at that time as the manufacturer was always doing something unexpected. When they met the first question he asked the applicant, was, "Can you guarantee to burn all good hard brick?" Somewhat "peculiar" to ask for a guarantee of an impossibility. The next question was a poser. "Can you furnish security that you will burn all first-class brick?" Peculiar request, was it not? The

gentleman was a first-class man. He told me that he thought the man was a crank. He was one of Mr. Crary's peculiar kind. If Mr. Crary had the same manufacturer in view he could not have made things fit better than in his case, even to the sale and change of plant from time to time.

We are a peculiar nation. Each and all have their peculiarities morally, socially and in business.

A few years past the market was falling. A few Solomons in the trade called a meeting to see if something could not be done to help raise the price. They met in one of the offices on 30th St., and agreed that they would not sell their stock under a certain price, and that their vessels should lay at the pier until the price was reached. Without a doubt if that policy was followed there was sure to be an improvement in the market. They separated feeling that they were going to reach the desired end. I was talking to one of the Commission men when one of the gentlemen who had a barge of brick on the market, came up and said, "Hold my barge for a day or two and then let her go." Inside in the meeting, "Hold." Outside, "Sell at going price." Peculiar rather.

Again Mr. Crary, you are right. One more case of a brickmaker, and this is a very prevalent one, and one that has been a thorn in the side of the commission man many a time, because the manufacturer has failed to grasp the full meaning of the ninth Commandment. It is customary to ask one another what they are getting for their brick. If there is anything in the trade that is peculiar, it is that some always receive more for their stock than others, though they all go to the same market, and of the same grade, and in some cases the same man may sell the stock from both yards. In this case different men sold the product, but the yards joined and the grade was the same. The market was of such a character that it would not stand a fancy price. At one of the yards a vessel was loading for the New York market. The manufacturer asked his neighbor what he was getting for his brick. He told him and the price was away above what he was receiving.

The brickmaker spoke to the Captain about it. He told him there was some mistake, but he believed his informant. He said to the Captain, "I wish to see you before you leave." He met him that evening and gave him a letter to the Commission man. The Commission man read it and passed it back to the Captain with the remark, "What do you think of that?" The Captain replied that he was aware of its contents and that it was "Mr So and So that told him." "Are you sure?" "Yes." The Commission man said, "Your barge is placed, but I will let her lay, and I will go and see the parties." He met the manufacturer in the main street of the town. While talking to him, along came the man who had received the gilt edge price for his brick. The commission man said to him, "Mr. ——— tells me that you are getting such a figure for your brick." He hesitated before he replied, "Well," he said, "I did get such a price." "When?" "Oh, ah, about a month ago." "Where were they sold?" was the next question. "At Bridgeport." Think of it, to quote a price as New York market, when it was fifty miles down Long Island Sound, where better prices are always to be had. Peculiar, to say the least. The next question brought him down to Bed Rock. "What did you get for your last cargo?" He gave the figures. Just what his neighbor was receiving. The Commission man turned to the neighbor and asked if he was satisfied. "Perfectly," he replied, "I would not have believed that he would misrepresent to me." Peculiar again. "I thank you for the trouble you have taken, and in the future will not take in full faith, all that is told me in regard to what others are getting for their brick." These three gentlemen have passed away to meet at the bar of Him who said, "Thou shalt not bear false witness." No doubt, Mr. Crary, in his connection with the trade, could give your readers accounts of many peculiar men he has met. It would seem that those who make brick have strange whims. We will pass to another class, and see if he is effected in any way. Cases similar to the one just spoken of, have caused the "agents" a great deal of trouble. Some of the manufacturers have taken brick away from their agents and placed them in other hands on just such information as quoted above. Peculiar once more.

The Bulls and Bears of the New York Stock Exchange with the same drove of animals of the Chicago wheat pit are emulated, in a small scale, by those that deal in brick. The Brick Exchange meets in the Real Estate Building, 55-65 Liberty St., New York City. In the Stock Exchange they are called Brokers. In the brick industry they do not aspire to the name of Broker, but are called Commission men or Agents. Although in times past, there has, for the number engaged in the business, as many been broken by fickle fortune as in either of the other Exchanges. If you could

get BRIC-A-BRAC to write an article on "The Brickmakers I have met," it would show up some peculiarities, as well as be very interesting reading.

Here you will find the agent in all his power, sometimes he has plenty and to spare, at other times the power is in other hands, on West 30th St., south side of block between Eleventh Ave. and Hudson River.

His office is not as luxuriously furnished as his Brother's—the Stock Broker, on Wall or Broad St. No pictures on the wall, no sofa chairs or tete-tete but bare floor, I presume to represent the open yard on which the product he sells is made. He goes to his office from 7 to 8 o'clock A. M., rather earlier than he who deals in stock or grain. He will first look over his mail, and then start for the pier to see what accessions have been made to the market since he left at noon the day before. As his practiced eye takes in the situation he knows that more vessels have arrived. One would think that he would be pleased, as it would mean more money. Yes, there are times when they cannot come in fast enough. Then the time comes when he is like the men that worked in the veneyard through the heat of the day. He will work hard to sell, but will be like the man that buried his talent. He will still have his stock for sale. Why? Because there are too many brick on the market. A drop in prices is to be looked for. Just at this point you may look for something peculiar in him. He certainly occupies a peculiar position. The market is supposed to be in his hands, but is it? He goes back to the office, rings up all the dealers. Inquires if they want any brick. In the mean time the peculiar man has got in his fine work by telling the dealers that the market is full of brick, say 30 or 40 barges. They say "No, I do not wish any." Of the dealers in the trade there are very few that go to 30th street to look at the stock, especially during a dull market. Let an advance or scarcity of brick happen and you will see men come around for stock that you will not see there again until there is another scarcity of stock. As I have said the market is full of brick and as a result dull; every agent will be on the street and if by chance a dealer should appear, if only to look over the situation, he is bottomed-holed first by one and then another, setting forth the merits of their stock, working like Beavers. He goes down to the pier, sees what is for sale; once more they talk to him and finally think they have made a sale, when he will say, "I guess I do not want any to-day." Why? While down at the pier the peculiar man has sold him what he required, by shading the price $\frac{1}{2}$ or $\frac{1}{4}$ per M. So it goes through the forenoon. In the meantime, he has had a visit or a letter from his brickmaker asking him to give his barge quick dispatch, as he has no room under his shed to start an arch. If there is a

time when he feels as if he wanted more back-bone it is about now. No one wants brick, a market with lots of stock to pick from, the brickmaker wants his boat back quickly. As the Almanacs say, about this period look out for some peculiar doings. Noon has arrived; he will now transfer the fight to the Exchange. He will get there early, so that he can tackle the Bears one by one, as they come in, as he knows full well that when they all get together the Bulls will be on the run. Try as he may, no one wants brick. It is about time for the gong to sound. He makes one more effort. Do you want any brick. He is almost paralyzed when he is asked what is your price. He states his price, only to be laughed at. "Why," he is told, "I can buy them at a figure below yours." The peculiar man has been around. What can he do? The market is dropping, no use to hold; he sells. The belief would be that he was happy, as his troubles were now over, but strange it may be, it has just commenced. He steps to the door, gives the captain of the barge his order for his freight, with a postal card, as a receipt for the brick, to be mailed to him. Tells the skipper to hurry up and get a tug boat and get around town as soon as he can, as there is a berth for him to unload. The next morning when he arrives at his office, he finds the skipper there like a Roman sentinel. If he has a thought of the cause he hides it by asking him why he is not unloading. The reply is a settler. "There is no berth, there are four barges ahead of me." "Can you not sell me somewhere else?" "Great Scott, have I not been for the past week looking for some one to buy?" He goes to the "phone," calls up the buyer and asks if he cannot send the load somewhere else. Back comes a crusty "No, I want her here. If that does not suit you, sell her to some one else." It may be two weeks before she is unloaded, and the brickmaker is waiting, but he cannot do anything. Lucky he will be if during the time she is discharging, the captain does not appear like "Banquo's Ghost" to tell him that he has been knocked off." (Here one of the peculiarities of this part of the trade comes in.) The "phone" is in use at once, and he asks, as a favor, to let the vessel discharge. "But, I don't want them." Now, what is he to do? If he tries to sell them to some one else, the person knows that she has been knocked off for cause, real or fancied, as the case may be, he will take advantage of it and make him an offer, but below the price at which she was sold. He goes to the first buyer and tries to get him to take them. Here he discloses the cause why he stopped her, but says he will give so much for them, probably a quarter or half dollar less per M. What can he do but accept, and she is unloaded. Odd, that he did not want her at any price, as they were not good enough, but at a lower figure they are all right. Just such cases occur every

day when the market is in the Bear's favor.

Your readers would think that when brick was seven or eight dollars per M. that would be the time they would kick, not so; anything in the shape of brick will go then. But let the price drop as low as it was last summer. Every brick must then be just so or be knocked off.

That is one side of the picture. Sudden changes take place at times in the market. It may be very dull one week and very active the next. The same buyer that has been talked to on the street during the dull time, will not see an agent in sight. If he wishes to see him he steps in the office. Presto, what a change. I can only liken him to a Cadet at West Point. All backbone. No asking if he wants any brick to-day. He knows that he has the stuff and the dealer wants it and wants it the worst way. The buyers are on the anxious seat this time. The Commission man knows that when he goes to the Exchange all the Bears from the City, Brooklyn and Jersey City will be there. Then the Bulls will have their innings. The Bears will follow them around asking as a favor to let them have this or that cargo. Oh, how they will beg. When the week before he would treat the agent with scant courtesy. The dealer will ask the Commission man what price he wants, and if he cannot let him have such and such a cargo; he will promise a good berth, a chance to pile, and he will promise almost anything to get them, as he is in the "soup" and he knows it. He will buy them give the skipper his order, in three or four days he will have his receipt and not a fault to be found with the stock. While in the case of the dull market, it was two weeks before the vessel could be unloaded and the price cut beside. If the agent is not peculiar, he is in a peculiar position. As the doctor places his finger on the pulse of the patient to judge of his condition, so the agent stands between the manufacturer and the buyer. He is able to judge the state of the market. The doctor, if he finds a decided raise in the pulse of the patient, will use measures to counteract. If the manufacturer would listen to the advice often given by their agents, there would be a change for the better.

There is perhaps no man engaged in the business that is so much abused as the agent, both by those that consign their stock to him and those that buy of him. Why is this? The brickmaker expects him to accomplish impossibilities when he, the brickmaker, is doing all he can to make impossibilities certain. When Hutch and Partridge could control the wheat, they could name the price, but when a combination was formed and there was a good deal of grain on hand, a decline took place. Just so with the brickmaker. He will keep sending his stock to a market that is full to overflowing; ask him to hold

his barge instead of sending her in and he will pay no attention. Another is urging his agent to sell, as he must have money. If he does, it must be at a fall in price, and so it goes. And then they abuse the man for not getting a good figure for the stock. At one time last season there was on the market 50 barges of brick, when one-fourth of the number would have supplied the trade. Who was to be blame for this, the manufacturer or the agent? Do you wonder the agent gets peculiar at times? There is one more phase of this most peculiar trade, in which buyer, maker and agent figure. If ever a man gets in that mystical position of between the devil and the deep sea, the agent is in it in this case. When a vessel is discharged some dealer will want the captain to take receipt for so many thousand of a different grade, as it would be just so much in his pocket, although he has sent the brick to a job and has all his receipts for Hard. The captain refuses to take a receipt of that nature. (And the captain is right in this, for the responsibility is on him for the agent can show his receipt and the captain may lose his place.)

He will say, "give me a receipt for so many brick." Quality and grade not mentioned. The freight is the same, if they did not bring over \$2.00 per M. The captain mails it to the agent, he effects a settlement as best he can, sends it to the brickmaker and he raises a row, that they should have been all hard brick and brought the price of that grade. He will probably say to the agent, "You should go and look at them when they were unloading them." Think of it, expect a man that has 15 or, may be, more yards to sell for to go to each vessel and see what kind of brick she is putting out. He is not Omnipotent, and it is impossible for him to be at 30th St., at the Exchange, go to South Brooklyn, Harlem, Jersey City, Hoboken and other points of the Harbor where vessels may be unloading. Still there are just such *Peculiar* people in the trade; they think an agent should do all this. The Commission man may not be immaculate, but "Like begets like," and contact with peculiar people probably makes him one of them at times—who knows?

Brickmaking is a business that seems to have a fascination about it, and it would seem that the saying, "Fools go where angels fear to tread," is verified in it.

The Diamond Brick Co., at Haverstraw, gave up two yards this spring, on which their lease had expired, because they could not get a reduction on the lease. They have run them ten years and certainly are in a position to know what they are worth to them. Do they remain idle? Not at all. Others have leased them. What will the harvest be?

Individual effort will accomplish nothing. It is like Mrs. Partington trying to sweep back the ocean with a broom. Get together. Make a combine.

Have something to say about your own business. Don't let the dealer have you by the nose through your own foolishness. Just look how absurd one part of your business is. Your barge costs you \$6,000. You load her, send her to New York market, she is sold, goes to a place to unload, and it may be two or three weeks before she gets out. You have crew on, paying them all the time, besides your wharfage, and get nothing for the time of lying idle, making a store house of your boat for the dealer at your own expense, when if he had the brick put on dock, he would have to pay dockage. There is no other class but gets demurrage, so should you. So it is all through. Wake up from your bondage, and from associations without delay.

Now what shall be done to help the agent? Go down to pier, 2 East River, and you will see a man come down the street from the Produce Exchange with a stick in his hand that looks like a sky rocket, only it has a tin cap with a piece of chain attached. Watch him, he will board one of the canal boats there, lift the hatch, jump down on the cargo of oats or corn, as it may be, push the sharp pointed stick down to the bottom of the boat, then pull it up. When it reaches his hand, the tin piece at the bottom has come off and is full of grain, from the bottom of the boat, showing that it is of the same grade all through. He dumps it in a little box. The broker shows what he has to sell. The buyer has a sample to go by when the cargo is unloaded. So with brick, the agent should have a memoranda from manufacturers of the grade of brick and sell by it.

Gentlemen, you would not have to fight as you do now. You would not have to be told it is a "first-class" load and a first-class price is what I expect. When you ask the captain how his brick run, have him tell you a few light and washed. "First-class" to be sure. The argus eye the buyer would have lost its use.

What about the dealer? What he bought he would settle for, and not be a week about it, and some of them would think a cyclone had struck them.

May the change speedily occur.

If any of your readers should be in Gotham, if they would visit the Exchange, they would be welcome.

A. N. OLDTIMER.

OLD, BUT SEASONABLE.

I'd like to be a polar bear,
Among the icebergs prowling,
When frozen seas stretch everywhere,
And bitter storms are howling:
I'd like to be an esquimaux
Upon an icy disk, sirs;
I'd laugh to feel the north wind blow
Unceasing through my whiskers.

—Nebraska State Journal.

Written for the Clay-Worker.

THE LAYER AND THE LADY.



ME, as a man up a tree—figuratively speaking, of course—it seems that they who handle the brick, after my lord of the brick kiln has got his load off his hands, has

been most shamefully neglected in the pages of the CLAY-WORKER. As if, indeed, the knight of the trowel and the trusty squire who trots after him so nimbly with the hod is not worthy of more space than is awarded him. Of course, there is, I suppose, a Hod Carriers' Gazette, or mayhap the Brick Layers' Trowelette, but they must be, if they exist, only dry mediums wherein my worthy friends who build walls may talk shop. What is required, in my mind, is this: Periodicals devoted to kindred pursuits should set apart a "Bricklayer's Corner" and a "Hod Carrier's Gossip" department. I would like



to conduct the corner and the department—for a month only,

I have the misfortune to occupy a roost which my grasping landlord terms a flat or apartment, and for which he exacts tribute in the form of rent. This

roost overlooks a mammoth apartment building in course of construction. Some measly contractors pulled down the building which stood on the site of the big one going up. I think the contract was awarded to the contractor who agreed to raise the most dust in tearing down the old one. If there is ever a medal given to any one, and my contribution thereto is desired, it will be for a medal given to the man who will invent a brick which will not require any mortar when used in making a house wall. But all this is straying from my brick-laying and hod-carrying friends. These worthies are now working on the third story of the new building, which is on an exact level with my humble abode. I can watch the bricklayers as they so carefully lay the bricks of the outer and inner tiers and so-carelessly dump odds and ends of brick between. How is it Mr. Building Expert? Hadn't there ought to be a law preventing sordid capital from using lower case brick in a sixteen-inch, eight-story high wall?

Again I am straying from my interesting friends, the bricklayers and hod carrier. He is a new, if close acquaintance—scarce three feet away—and I have not become sufficiently attached to him never to stray away. If I ever become on terms of perfect familiarity with him I may prevail on him—I am speaking of the bricklayer and his carrier collectively now—prevail on him, I repeat, to smoke tobacco which retails at something more than 19 cents for two pounds, and to change his pipe for one whose asthmatic wheeze can not be heard in the same block. I am a smoker myself, and of pipes at that, but I am a stickler for pipes whose bronchial tubes are intact, and believe in tobacco that does not reek, when burned, as if there were a total-loss-fire in a hide and tallow warehouse.

Have I said ought that could be construed into lack of respect for the worthy workman? Am I not known as the champion of the laborer? I mean no disrespect to the good layer of brick or the lusty carrier of the hod. Nay, I am under deepest obligation to them both, and, moreover, to their pipes. As I write they are nearing the fourth story—apt workmen are they. When they are abreast with the fourth floor, which is directly over them, they will, forsooth, be on a level with my neighbor above. My neighbor above is a severe, almost savage lady, with a meek and humble husband attached.

She detests tobacco in any form, and prohibits her husband from using it, forgetting that tobacco keeps away sand flies, mosquitoes, bats, flying cock-



roaches, scorpions and sour visaged old maids. She has even made much complaint because I do smoke, averring that the fumes from my pipe and cigars arise even to the flavorless precincts of her apartments, giving unpopular scents to her curtains and domestic ornamentations. I trow she will remember those



same fumes as aromas from araby blest when she gets the full, fruitful, if noxious vapors from the gay bricklayer's pipe (reinforced at intervals by that of his coadjutor, the carrier of the hod). I have tossed them each a quarter to buy extra tobacco with.

CHARLES LEDERER.

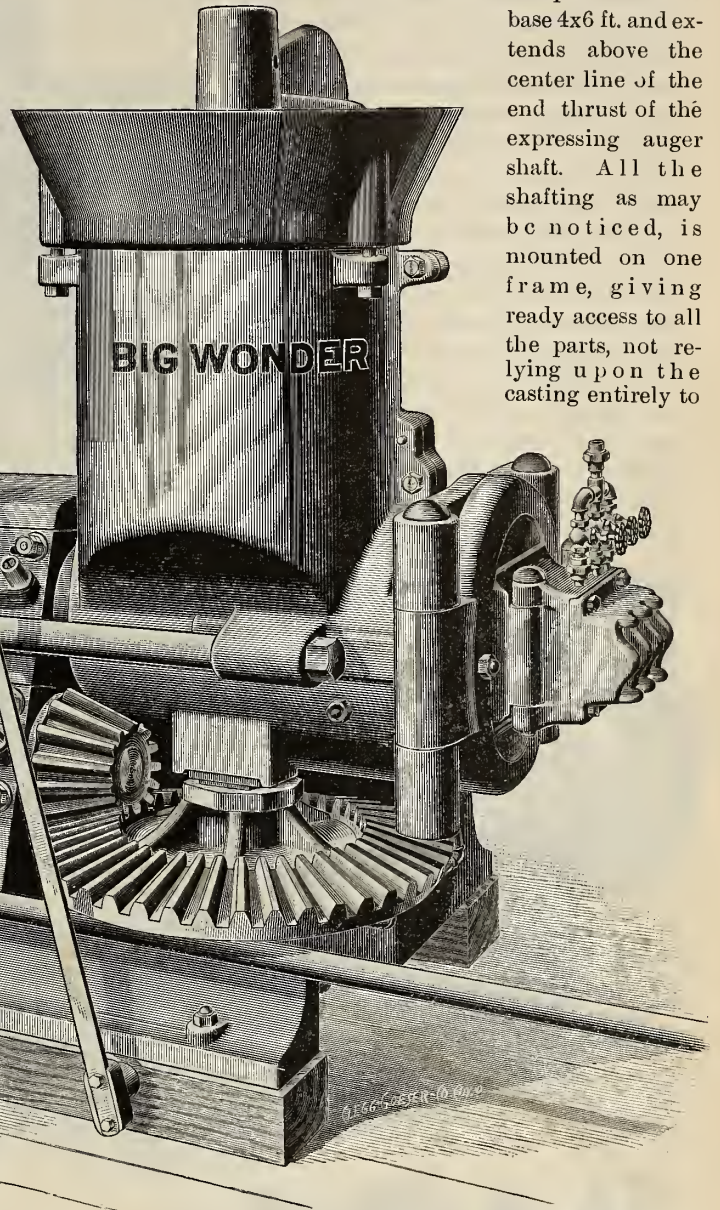
FORWARD MARCH.

WHEN one stops to think of the rapid strides that is being made in machinery, reflecting back to Watt, with his crude and cumbersome engine, taking steam at a low pressure, at one end of the cylinder, condensing the steam in order to create a vacuum, that the atmosphere might force the piston back to its original position. Then look at the old river Steam-Boat, with the irrepressible boy adjusting the valve by hand at the proper time to admit the steam in to the cylinder, getting tired, sits down and invents an automatic arrangement to trip the valves. Then pass to the latest improved compound triple expansion condensing engines of our Ocean Steamers, then follow the progress of the stationary engine.

bed-plate with cylinder guides, etc., mounted several inches above the center line of strain. The bed-plate being the Backbone, as it were, of the engine, is now designed to extend above and below the center line, giving great strength without excessive weight, as many parts such as Cylinder, Steam-Chest, Guides, Base Bed-Plate and Pillow-Blocks, are embraced in one casting dispensing with many joints and bolts which are liable to work

the designer has taken advantage of high speed engine designing; by increasing the Little Wonders capacity to double what it formerly was, calling it the Big Wonder, by mounting the clay-cylinders on a bed-plate which forms a back-bone. The

bed-plate forms a base 4x6 ft. and extends above the center line of the end thrust of the expressing auger shaft. All the shafting as may be noticed, is mounted on one frame, giving ready access to all the parts, not relying upon the casting entirely to



It is only a few years since an engine having a 10 x 16" cylinder, was rated at 25 horse-power, while to day a 14x14" engine with its high rate of speed, and with a short point of cut off, is rated and will develop 125 horse-power by applying the same rules that Watt laid down.

This high duty of the steam engine, was not obtained by an increase in the size of the cylinder, nor in adding excessive weight to the different parts, (as one would suppose), but by increasing the speed and designing the engine with symmetrical system, instead of a massive

loose and give trouble. We could follow in like manner the history of improvement in brick machinery from its crude beginning to the present point of supposed perfection. It, like the engine, we predict, will ere-long produce double the present capacity without increasing the size of the clay-cylinder, then the same rules that governs the designing of engines, will necessarily have to be applied.

The little Wonder Brick Machine has gained a record as a brick-maker, and by referring to the accompanying illustration of the Big Wonder, it will be noticed that

take the strain, but providing wrought iron rods to receive the pressure of the expressing auger.

There are several other features about the design of this machine, such as the dies swing on hinges, and bearings removed from the clay etc., which we have not space here to mention, therefore will refer the reader to the manufacturers, The Wallace Mfg. Co., Frankfort, Ind., who take a pride in keeping pace with the wants of the trade, with a full list of improved brick machines, Automatic and Hand Cutting Tables, Pug-Mills, Clay Crushers and Stone Separators, etc.

AUTOMATIC BRICK CUTTER.

AN interesting feature in connection with the study of brickmaking machinery is the rapid advance that has been made in methods and appliances securing convenience and efficiency in an increased degree, and reducing the labor and consequent cost of production. One of the departments in which great advancement has been made is that of brick cutting devices, and the stride from the slow and laborious hand cut-off tables to the improved automatics of to-day, with separating carriages, and automatic sanders as auxiliaries, has been, indeed, a great one, and one which clayworkers in general have not been slow to appreciate and take advantage of.

The Penfield Automatic Cutter which we propose to describe in this article is one which commends itself to the good judgment of the trade generally, first by its simplicity, and further by its perfect adaptability to the work attempted

readily seen that as the bar of clay is on while in continuous motion, if the wires moved straight down, an angling cut would be the result, consequently the cut-off is so constructed that the

quickly adjusted by means of the lever on the opposite side of the cutter. The tension of the auxiliary belt is regulated so as to furnish nearly enough power to do the cutting. The balance of power

required is furnished by the moving bar of clay, which thus regulates the speed of the reel, and secures uniform cutting. The resistance caused by the weight of the bar of clay, and the work it has to perform is just sufficient to retard the flow of the clay through the die a trifle, allowing the corners to fill out nicely, and securing a nice, square, smooth bar of clay.

The apron on the second section of the carriage runs at increased speed. Consequently, as the bricks are cut off and pass upon it, they are separated so that they can be lifted from the apron by the ends. (See

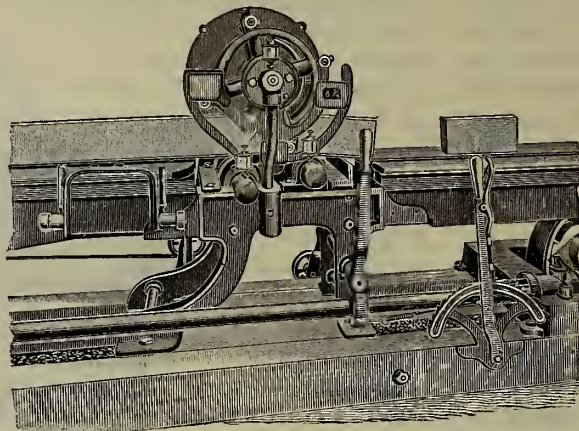


FIG. 2.

adjustable wire holders, while making the cut, travel in irregular shaped cam tracks (See Fig. No. 2), moving the wires in the proper direction, horizontally and vertically, to compensate for the movement of the bar of clay, and insure a straight, even cut. At this point there is another difficulty which must be overcome, and in the cutter under consideration the remedy is a very ingenious and effective one. The speed of the cutter must conform to the speed of the bar of clay, as if the reel revolved proportionately slower or faster the bar of clay would be likely to kink or separate, and the brick would be cut in irregular lengths. Furthermore, it would be manifestly impracticable to propel the reel entirely by the power the moving bar

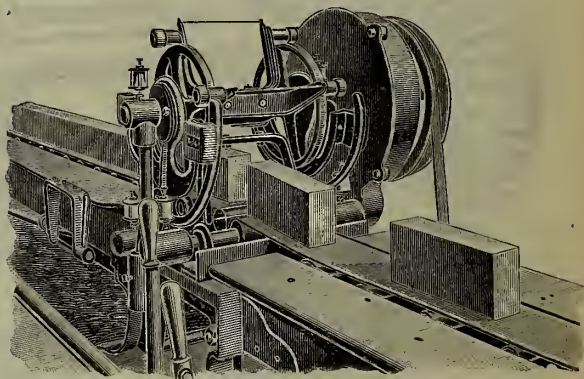


FIG. 3.

Fig. No. 3.) The Penfield Cutter cuts the brick while running upon their narrow surface or edge. Thus, if the descending wire should strike a stone in the bar of clay, causing it to deflect,

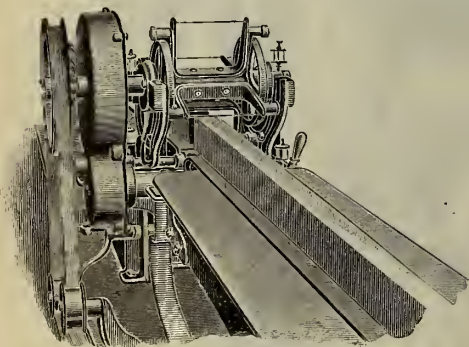
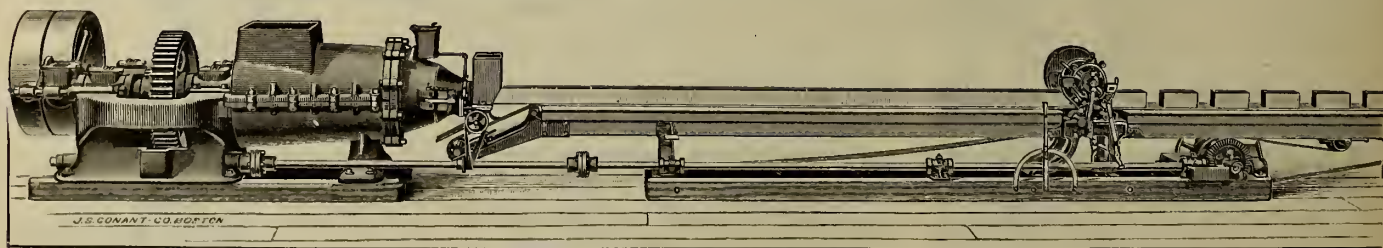


FIG. 1.

which it performs with never failing accuracy and regularity.

The general manner of construction of the table is as follows; The carriage is made in two sections, the end of the first section being provided with a revolving reel with self-adjusting wire



PENFIELD AUGER BRICK MACHINE, WITH AUTOMATIC CUTTER AND SEPARATING BELT.

holders with wires attached. As the bar of clay emerges from the die it runs upon the apron until it encounters the wire-strung reel (See Fig. No. 1) which revolves at proper speed, cutting it into brick of uniform length. It will be

of clay would exert, as the work would be so great as to cause it to buckle and kink. In the Penfield cutter the happy medium has been hit upon by providing an independent auxiliary reel driving belt, the tension of which can be

the irregularity would not be apparent at the top or face of the brick where the cut was commenced. This is a decided advantage over devices which cut the brick while running on the broad side, as any such irregularity would then be

very evident in the face of the brick.

The Penfield Auger Machines are also provided with an automatic sanding device, just in front of the die, which evenly and uniformly sands the bottom of the brick, obviating liability of sticking to the off-bearing belts, and permitting the hacking of the bricks as they come from the machine, without danger of adhering together.

These features render the work of the Penfield Auger Machine perfectly automatic in every detail, so that the clay, after being fed into the machine, requires no further manual labor until the brick, automatically sanded, cut and separated, are received at the end of the off-bearing belt ready to be placed upon the dry cars or trucks preparatory to being conveyed to the drying department.

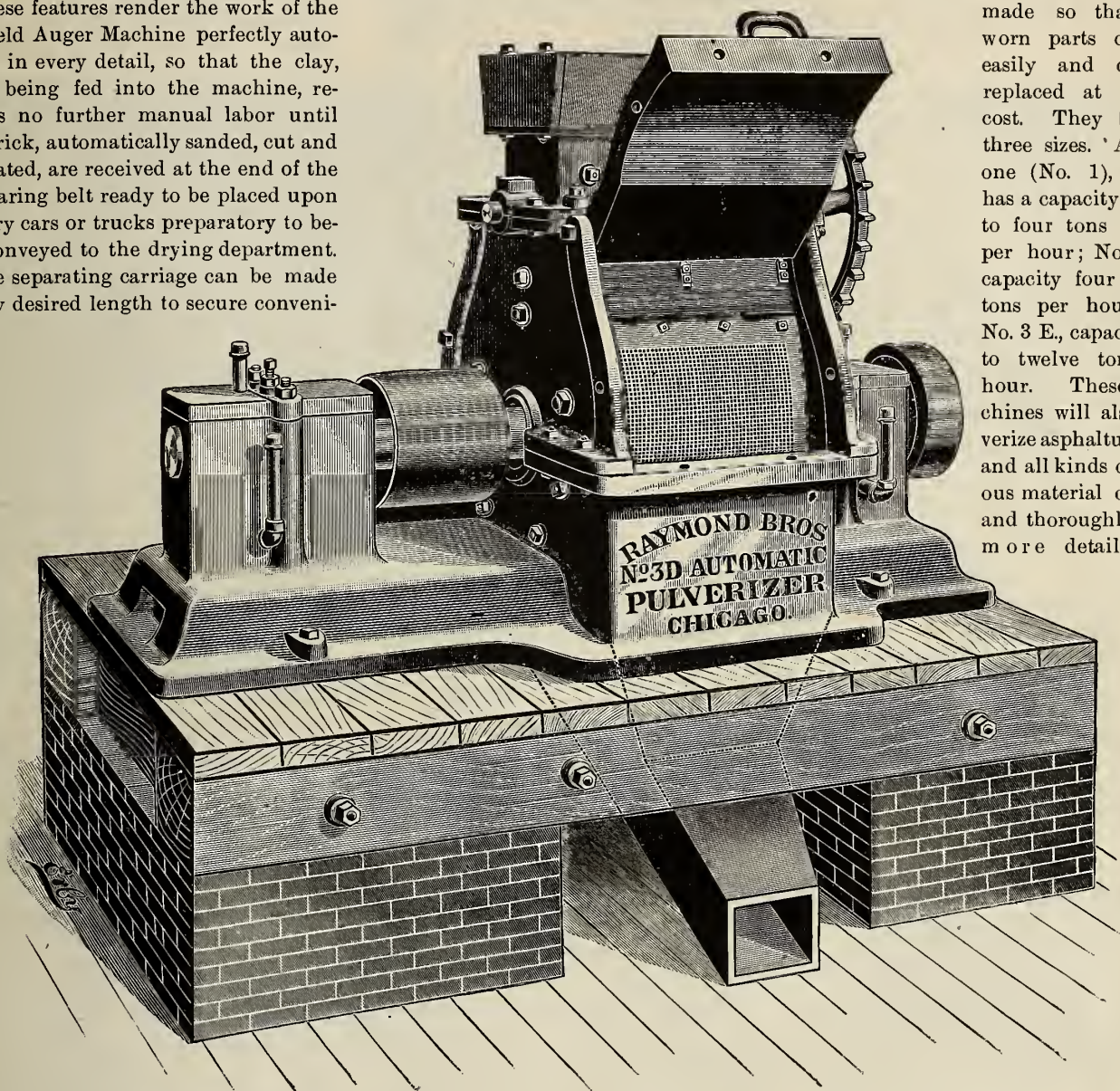
The separating carriage can be made of any desired length to secure conveni-

in this subject will doubtless find it to their interest to secure further details and description, which will be cheerfully furnished by the manufacturers, Messrs. Penfield & Son, Willoughby, O.

It has been calculated by Prof. Rogers, of Washington, that the dynamic power of a single pound of good steam coal is equivalent to a man's work for one day;

Raymond Bros., 303 South Canal street, Chicago, have had several years' experience in making and using this character of machinery, and believe that this No. 3 D. Pulverizer is peculiarly adapted to brickmaker's use for reducing all semi-dry clays or shales. Its construction is such as to give it large capacity with light power and seemingly no wear. The exposed parts, however, are

made so that any worn parts can be easily and quickly replaced at little cost. They build three sizes. A small one (No. 1), which has a capacity of two to four tons of clay per hour; No. 3 D., capacity four to six tons per hour, and No. 3 E., capacity six to twelve tons per hour. These machines will also pulverize asphaltum rock and all kinds of fibrous material quickly and thoroughly. For more detailed de-



ence in handling the brick. In one factory, after the brick are cut off and separated, they are automatically delivered upon a transverse belt running at right angles to the automatic cutter, and delivering the brick at a distant portion of the yard.

Letters patent have already been allowed upon this valuable invention, and further patents are pending.

Any of our readers who are interested

three ton, for twenty years, and one square mile of a seam of coal only four feet thick will represent the labor of a million men for twenty years.—Ex.

NEW IMPROVED PULVERIZER.

THE accompanying cut represents an improved pulverizer for which several important advantages are claimed. The manufacturers, Messrs

description, price, etc., address the manufacturers as above.

The East Liverpool Review, after interviewing the managers of the different potteries in that vicinity, says that the lay-off this Summer will be a very short one, lasting from one to two weeks. It also says that the works are in excellent condition, with a demand for all their output. Several of them will not lay off at all.

A MATTER OF DOLLARS AND CENTS.

TO BRICKMAKERS:—Financially it is of immense importance what brick press you buy, for on its work depend your success or failure for the first year or two. This first year or two will make or mar your entire business life. Then don't make a mistake in choosing your brick press which you will spend years in regretting.

Remember that the strain on a brick press is tremendous at best. Few people realize that 50 to 60 tons on *each brick* is the pressure applied to ordinary clays, while many require double that amount. Only the most carefully designed and accurately built machine can withstand this great pressure for any length of time.

In selecting a brick machine there are two mistakes to avoid. One is to "save" a thousand dollars or so that *must* be paid in order to get a durable, well made, reliable press; the other is to pay a thousand or so for nothing, for which you get no equivalent. How is the inexperienced brickmaker to steer clear between these two crags?

The majority of brickmakers are not expert mechanics. They have not usually had the training necessary to make them competent to pass judgment on such a piece of machinery as a brick press. To such we would say that it will be greatly to their interest to have some skilled mechanic, one in whom they have confidence, look over the working parts and details, mechanical motions and construction of the various makes of brick machines in the market, and take his advice. Any engine or boiler of standard make will serve its purpose; this is also true of shafting, pulleys, belts, etc., but the brick press itself, subject as it is to tremendous strains, and running in grit and clay, should be carefully considered in every part. No opportunity must be given the clay to work into the joints and journals, or accumulate at any point to render the machine inoperative. It must not be subject to wear or break-downs. Its adjustment must be simple, and all parts must be accessible. It must possess immense strength to make it absolutely master of the clay.

Brickmakers should remember that the one thing which cannot be altered is the material to be worked. The press will probably cost as much or more than all the other machinery of the

plant combined. There is scarcely a chance of getting an absolutely worthless engine or boiler, or piece of shafting or pulley. There are *absolutely worthless* brick presses on the market. A poorly designed or badly constructed brick press is without doubt the sorriest failure known to mechanics. If it be the source of any profit, it will take most of that profit to keep it in repair, besides causing serious losses of time and temper.

Respectfully Yours,
CHISHOLM, BOYD & WHITE.
Chicago.

Written for the Clay-Worker.

BRICK FOR STREET CROSSINGS AND GUTTERS.

WHILE the matter of street paving with bricks is still a matter of doubt, with some of our smaller cities and villages, and authorities hesitate to adopt brick as a paving material, because they themselves have not made or seen any test of the particular bricks they desire to use, we think there is a plan by which the test can be made cheaply and satisfactorily.

In all streets that are paved with macadam, it is necessary to establish crossings for pedestrians at the street corners or intersections of streets. These are made of large blocks of stone twelve or fourteen inches in width, and usually laid in two parallel courses across the street.

The solid rock of the crossing does not wear off, or grind out under the wheels as fast as the crushed rock of the street, and the result is, the crossing is soon left standing from two to four inches higher than the street level, and it acts as a bumper for vehicles. This is annoying to drivers, and oftentimes dangerous to occupants of carriages and wagons; particularly when passing rapidly over them.

Another serious objection to the rock crossing is noticable in muddy weather. A vehicle in passing over them at a rapid pace strikes them with a jar which knocks the mud off the wheels, causing it to fall on the crossing or near it, which makes it anything but a desirable place for passengers to cross, there being more mud at the crossing than at any other point in the street.

The remedy we would suggest is, to take up these "Thankee mam's," and in their stead put down a good, wide crossing of paving bricks; making it not less than four feet in width, rising with a

gentle curve of four or five inches in the center; adopting the same plan for a foundation, as if the whole street were being paved with bricks.

The vehicles will then be gradually eased over without jar. Instead of the dirt collecting on the crossing, the wheels will naturally carry it off. Rains will help to wash them off; and the test will be fully as good as the whole street were paved with brick.

The same plan be pursued with the gutters. The method now in common use is to pave the gutters with large flat rocks of unequal size and thickness, and requires but a glance to prove that they are not only unsightly, but inconvenient, and hard to keep clean; therefore, unhealthy, and more often than otherwise, the smells rise to Heaven in protest against the method.

Let the gutters be constructed of paving bricks, and put in from four to five feet in width from the curbstone properly laid to the grade of the street. The gutters are not subject to so great traffic and wear as in the center of the street, but will make a good test in regard to cleanliness and healthfulness, in comparison with the rock gutter. They are much easier kept clean; a laborer can, with ease, clean up and remove the dirt from double the amount of brick gutter than from that paved with rock.

The brick gutters can be flushed and cleaned, or showers will sweep them clear of filth that would otherwise lodge in the spaces or openings around the corners or joints in rock guttering.

Lightning played with fatal effect in the big brick works of James Dingee, 26th St., Philadelphia, recently. Sheltered from the driving rain beneath one of the sheds were four workmen. While the storm was at its height a deadly bolt shot through a small aperture in the loosely boarded roof, and killed one of the men and badly shocked the three others. The greatest excitement prevailed among the 500 employes of the yard, and their terror was augmented by the gathering of as many more persons from the neighborhood, the disaster seeming to become known almost with the rapidity of its happening. So unnerved were the men that it was difficult to persuade the night kiln firemen to remain at their posts. This, though the most furious wind storm in the memory of Mr. Dingee, did no damage to the yard. Ordinarily the loose boards of the roof are hurled about, tables blown around and injury done, though none results elsewhere. This time not a board was disturbed. Save for what looks like a pen-knife scratch in the post, there was no evidence of the strange fluid's work.

CORRESPONDENCE.

THESE COLUMNS ARE OPEN TO ALL. THE FULL NAME AND ADDRESS IS REQUIRED BUT WILL NOT BE PUBLISHED EXCEPT WHEN PERMISSION IS GIVEN BY CORRESPONDENT. THOSE DESIRING TO COMMUNICATE PRIVATELY WITH ANY CORRESPONDENT WHOSE FULL NAME IS NOT GIVEN CAN DO SO BY ADDRESSING LETTERS CARE OF CLAY-WORKER.

A Trip to Chicago and a Chicago Brick-Yard.

Editor Clay-Worker:

I have just returned from a trip to Chicago, having taken advantage of the cheap rates incident to the Democratic

'The World's Fair.' Let me say to those of your readers who have not been there, that it is not difficult to imagine that the whole world is interested in the preparations being made. The whole affair is so large, so grand and withal so symmetrical that my mind is still in a whirl when I try to think of what I saw there. Think of one building covering 32 acres, and then forgive me for not attempting to describe it. Being a resident of New York state I was naturally in

I found him at his office busy with the cares of two large stock Companies and was welcomed as warmly and cordially as though I had been an old and valued friend. I asked modestly for a permit, to visit his works and was answered by his looking at his watch, suddenly closing his desk and saying, "We have just nine minutes to catch a train, come on," and before I could catch my breath he was in the hall calling to the elevator boy, "Down" in tones that fairly fright-



EMPTYING A KILN AT THE WORKS OF THE PURINGTON-KIMBELL BRICK CO., PURINGTON, ILL.

Convention. Truly Chicago is a great town. Its magnificent buildings, its wide streets, beautiful parks, its push and energy make it indeed the wonder of the world. Even in the amount of its rainfall, it has not been outdone by any other City in the United States. I did not attend any of the sessions of the Convention, but spent two whole days looking over the so called World's Fair grounds. I say so called because every one in Chicago who alludes to it, calls it

favor of the chief City of the United States for this Exposition, but when I saw the outlines of the plan and realized the amount of energy and money the citizens of Chicago had expended in a year I could not help saying "it could not have been in better hands." This being my first visit to Chicago I felt that I could not forego the pleasure of calling upon Ex-President Purington of the National Association whom I had not seen since the Convention at Memphis.

ened me. I caught a little of the Chicago rush, and in that nine minutes we had walked six squares or "blocks" as they say in Chicago and had just caught the last car of the train as it moved out of the depot. Mr. Purington did not comment on the 2:40 gait he had shown and which I had followed. Indeed it seemed to me that it was an every day occurrence with him. In about an hour we reached "Purington Station" about 14 miles from Chicago, and I was shown

through one of the most complete brick yards for the manufacture of common brick I had ever seen. Mr. Purington introduced me to his Supt., Mr. Geo. H. Drew, by saying, "Nine years ago I took this man off a brick wagon to make a foreman of him," and while I have no desire to detract one iota from the credit due Mr. Purington for what he has done for the brick trade I could not help feeling that even he, hardly realized how valuable an auxiliary he had in Mr. Drew.

The Purington-Kimbell plant consists of six large sized Chambers machines with artificial dryers, two large sized Marion Steam Shovels, Chambers Disintegrator and Pug Mills, and Drakes Conical Rolls, etc.

The output last year was a little more than eighty millions. This year up to the day I was at the yard, (June 23rd) they had made a little more than 37 millions, and had rebuilt one third of the plant which had been entirely burnt up in January. The material is a very coarse grained hard blue clay and is dug with the steam shovel from a bank about 23 feet deep and deposited in cars which are drawn by horses to the foot of the incline near the buildings. These cars are drawn up into the buildings by a cable hoist and dumped into the disintegrators. The cars are built solidly over the wheels and the dumping is done by tipping a part of the track. This idea Mr. Purington says he stole out right from the Blair Brothers of Cincinnati. The disintegrator cuts up the clay and feeds it automatically to the Drake Rolls, from which it is carried to the Pug Mill on a belt conveyor. Water is added as the clay goes into the Pug Mill and altogether the movement is continuous to and through the machine. The brick were being cut off at the time I was there at the rate of 172 per minute. The average days work for each machine being 60,000 in eight hours. Three boys take the brick from the belt and put them nicely and regularly on iron cars, which when loaded are put into the dryers. These dryers I had heard Mr. Purington describe and read other descriptions so that I felt tolerably familiar with them, but I confess to being agreeably disappointed in the results he obtained in 24 hours drying. I did not see a single brick that did not seem to be perfectly dry or that had a check or crack in it. These dryers are simply brick tunnels with iron doors, with an oil burner at one end and an exhaust fan at the other end

No patent on it and Mr. Purington says it is simply a common sense application of well established theories, viz; hot air rapidly circulated. I was somewhat surprised to find that the kilns in use were of the old fashioned kind, as I had gone there with the expectation of seeing Mr. Eudaly's down draft kiln, but Mr. Purington explained that it was on his paving brick plant at Galesburg, that these were in use. They usually burn 26 arches at a time, the kilns being set 47 long and 45 high, each kiln containing about 900,000 brick. The cars containing the dried brick are run from the dryer direct to the kiln. The only handling by hand labor the clay gets from the time it leaves the bank until the cars of dry brick stand along side the kiln is when the boys take the green brick from the belt and place them on the cars. In many respects this yard is a model. The men are the finest in appearance I ever saw on a brick yard. There is no swearing, no shouting, and no beer guzzling. The Company and the men make an agreement early in the year for the current year covering all possible points over which a dispute might arise and Mr. Purington told me that out of 218 men and boys who signed this years contract there were but six who could not write their names. With the exception of the steam shovels on which coal is used all the fuel for steam, drying, and burning purposes, is crude oil. I cannot commend the general appearance, of Chicago brick, but I can say, that I have never seen better or more evenly burned kilns, than I saw at Purington, Mr. Drew showed me some excellent photographs of the works, and promised me a full set, which when received will be preserved as mementoes of a delightful afternoon. A portion of the time I was at the works it rained very hard but the twelve men in the clay bank, donned oil cloth suits and "sou' westers" and the machines kept on turning out brick. The motto there is, no matter what happens make brick, and from the little that I saw I am satisfied that this is done most of the time, and my advice to craftsmen visiting Chicago is that a few hours spent at Purington will repay the effort especially if they are lucky enough to have the company of Mr. Purington who pays their fare and furnishes good cigars.

A. KNICKERBOCKER.

A Challenge.

Editor Clay-Worker:

We are making daily, with the McKenzie machine, from 2,500 to 3,000 12-

inch tile and from 11,000 to 14,000 4-inch, which we think is doing pretty well for boys. If any of your readers are doing any better we should like to hear from them, and will then pitch in a little sharper. What has become of all the old time tilemakers, and the new ones for that matter? Let's not let our brickmaking friends monopolize all the space. Speak up and give us your experience, and many, not so old in the art, will be greatly benefited.

Yours Truly,

Buckley, Ill. DERROUGH & Co.

Paving On Street Railroad Lines.

Editor Clay-Worker:

This phase of brick paving has been discussed and written about a great deal of late, yet there are a few points which I have not seen mentioned, viz., the tendency of the brick set next the rails to constantly rise and shift in position.

My attention has recently been called to this in my own city, while others may have observed the same, I believe I have seen no mention of the matter.

In connection with this I desire to call attention to the habit of ramming the brick to the level of the surface after the brick are set on the street.

It has been observed that the jar of the iron rails of the track, caused by the running of the cars, has a tendency to move the brick out of the sand bed into which they were set. Every time the brick moves, be it ever so little, a portion of the surrounding sand finds its way into the space beneath. The constant ramming or striking the brick from the tops by the passing of vehicles, horses hoofs, etc., has a tendency to pack the sand beneath the brick so that as the brick rises the foundations become more firm. This often causes an uneven surface which places the brick at a very great disadvantage. The wear of vehicles have a tendency to break off the corners of the brick most elevated and to drop onto the surface of those most depressed.

I do not see how this difficulty with the ordinary brick can be entirely avoided, yet I think a very great deal can be done in this direction by properly laying the brick in the beginning.

I do not think too much care can be taken to have a uniform foundation both as to density and regularity of surface.

It is not an unusual thing to see foundations improperly prepared, in

this, that one portion is made more dense by rolling or ramming than another. Again, the sand foundation is often unevenly spread, being much thicker in one place than another. This arises often because of the unevenness of the sub-foundation, whether it be the natural earth, gravel, broken stone or cement.

To overcome these defects the sand is spread thicker in one place than another, consequently the brick in use will settle leaving an uneven surface.

Again, the contractor is often careless about spreading the sand so that the brick are at first set on an uneven surface and afterwards rammed to produce a uniform height or level surface.

We think it does not require any argument to point out the serious results that must follow.

Referring again more particularly to the brick along the line of the car track, it often happens that the space between the track rail and the brick forms a gutter, in fact the flat rail now being almost universally in use, forms of itself a gutter for the water.

The water passing along gathers a sediment which settles in the spaces between the brick next the track which, when dry, sieves down or settles beneath and at the sides of the brick as they are moved by the jarring of the rails.

I am aware that much that I have said applies equally to streets on which there are no street railroads. I am also led to observe that much I have said tends to point out defects without giving remedies; still I think the remedy in all but that caused by the jarring of the street-car track, can be easily seen by any one, and certainly much can be done to remedy the latter by properly laying the line of car tracks.

The foundations between and beneath the rails is too often neglected. Usually the street railroad company prepares the foundation and builds this part of the street. The inspector is inclined to allow the railroad company to have its own way, it being supposed to be the principal user.

Now that so many electric roads are being built little or no attention is given to the foundation or street between and longside of the rails.

Cannot we have more care taken with the building of that part of the street occupied by the street-car lines in addition to a more thorough preparation of foundations, and the laying of the brick in the main part of the street?

Up to date, so far as my observation goes, very little attention has been given to the matters of street-car ways and foundations in comparison with that given to the subject of testing the brick to be used.

Engineers and city officials have—as a rule—gone to an extreme in the direction of examining and specifying the kind of brick to be used to the great neglect of the proper preparation of their final resting places. (I mean “resting places” of the brick, of course).

W. A. EUDALY.

The Shot-Gun System of Burning Brick.

Editor Clay-Worker:

Please accept thanks for your promptness in forwarding inquiries for “Will.” I received April number of CLAY-WORKER, and read with great interest, every article in it. My “ad.” has brought already three letters, from different points of the United States, which shows that your valuable paper is generally read by “Clay-diggers.”

After writing you last I read with interest Mr. George Walker's article; wherein he gives some very interesting reading upon “Causes of Failure,” and which brings to my mind an experience of my own that while it was rather embarrassing at the time, I have since laughed quite heartily at the result. Possibly my experience was in the same yard Bro. Walker speaks of. Here it is, if and you desire to publish it you may do so:

Several years ago, while employed, something less than one hundred miles from New York City, I learned of what was claimed to be the model brick plant of the country, being only seven miles away from my then place of residence. Well, as the summer came on and the kilns and dryers always seemed too awfully hot for any human to stand around, then my soul longed for a sail on the beautiful bay. So after getting a promise of a day off duty, I induced my room-mate, who was quite a sailor, to go with me for a sail to the famous brick plant. So we chartered a boat, and taking a jug of — water along, for fear of thirst, (the water we sailed over being to briney to drink,) we started one beautiful afternoon, and with a delightful breeze we soon drew up to a long dock that, report says, reached over $\frac{3}{4}$ of a mile to deep water, where all the brick made were loaded upon barges and shipped to New York. We tied our

boat to a pile, and clambered up to the top and walked towards the works, and after our astonishment at the immense proportions of every thing somewhat subsided, we looked around for the office, thinking is best to ask permission to look through the works, but somehow we missed the office and kept on into the place until we met a man whom we took for a foreman, and asked him if there were any objections to our looking through the place. He assured us there were none, probably knowing that common red brick are too cheap to steal, (unless a fellow could take a whole barge load,) and kilns of which there were eight in number, and machines and engines, blowers, steam shovels and every thing else on a magnificent scale, were too large to stow away on our diminutive craft, so we pushed on through the whole plant, with, as we supposed, the consent of one in authority.

After looking on until we thought we had taken in the whole concern, we started back to our boat. On the way out we met a portly looking person, who stopped and politely enough asked us “who we were and where we were from.” I being the spokesman, told him the port we were from, and were very much surprised to hear him say, “that he was the superintendent of the plant and that we should have gone to the office and asked permission.” I explained how we came to miss the office, when he re-asserted that he was the superintendent and he did not allow strangers there without permission from the office. I told him I was very sorry, but it was now too late, and we had already seen the elephant and were then going out.

I afterwards learned this same gentleman, who knew next to nothing about making brick, but who was a machinist by trade, was taking \$500 per month out of the business as a salary.

A few weeks afterwards he visited the place of my employers, and where your humble servant held a responsible position. When the superintendent came around to my department, he possibly felt rather small, if he recognized me in my regimentals.

After reading Mr. Walker's letter, I feel almost certain he tells of the same plant. My absence from the locality for several years has left me in the dark as to the ultimate result of employing \$500-a-month men.

These kind of men “come high,” but

we must have them, you know, until we have our eye-teeth cut, then there is a rupture and some one more worthy gets the place.

My own first experience was as a green hand. We paid a burner \$3.00 per day for this work. He was a good man, but I did not propose to pay that \$3.00 any longer than I could learn to burn brick myself. So the second year I made up my mind to tackle it alone. Of course all my friends advised me against it, but I concluded to run the risk of one kiln at least.

Now, previously we had always used wood to take off the water-smoke. As it was rather expensive, I concluded to try soft coal, as my kilns had good furnaces attached. My advisers held up their hands in horror, and prayed me not to do so, as the soot would clog up the kiln. Well, I was so stubborn that I went and got an old shot-gun (not to shoot my advisers) but the kiln. After getting the fires started, I knew of course, the soot would clog the kiln tight, unless I used some means to prevent it. My means was the shot-gun, and a good charge of powder through the peep hole in each arch, once in a while.

After the kiln was opened it was just as nice as any body's kiln, and where I had paid my former burner for 14 day for one kiln, I only credited myself with 6 days.

Probably some of your old readers have heard of the shot-gun racket long ere this. I was astonished myself at the result, for a regular cloud of soot would fly into the air after each discharge, then the fires would brighten up as nice as could be.

If any thing in this will benefit the craft please publish it, otherwise dump it into the waste basket. W. R. O.

The Drying Problem.

Editor Clay-Worker:

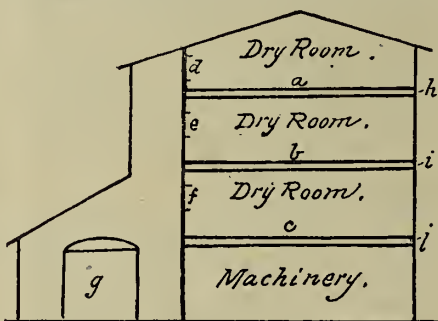
I have had so many letters from those who have noticed my paper on "Down Draft Drying of Clay Ware," which you printed in the May CLAY-WORKER—page 554,—asking for a further information, that I beg the favor of replying through your columns.

First, let me say that we have no patents on our process. Remember that I said the ware must be placed lower than the source of heat. You know if you have a tea-kettle with a spout rising higher than the top of the kettle, you can overflow the kettle by

pouring water into the spout, and exactly on the same principle if you invert the kettle you can admit heat into the spout until the kettle is filled; when if you continue to admit the heat into the spout it will rise into the kettle and crowd the lower strata of heat down and out the opening at the lid of the inverted kettle, so that you will have a downward current of heat. If you apply this principal to your drying you will have our idea.

Were I to construct just right for this kind of drying, I would build something like the accompanying diagram. a, b and c are different floors of drying building. (Make as many floors as you choose.)

Construct slat floor on top of joists and seal tight on under side of joists of



each floor. This would be so that you could control your heat so you could have any story cool to work in while the others were hot. g is kiln with roof over it, and large flue connecting with the different floors with opening into them. These openings to be provided with doors for closing. The heat from kilns or steam pipes or furnaces, located where the kiln is situated, would pass up into the dry room and down through ware and slat floor and between joists and off horizontally and out through openings inside of building at f. g.

Respectfully,

W. C. DENISON.

The Mixing of Clays and Other Things.

Editor Clay-Worker:

In the current number of CLAY-WORKER, I am gratified to notice that other persons, beside myself, look to the thorough mixing of clays for results.

During my experience with New Jersey clays, at the Perth Amboy Terra Cotta Works, we were instructed to be very particular about preparing the clay so as to get the best results. Often we mixed 4 different kinds to obtain a certain color, and after going

through the Newell Crusher, we pugged it twice and often times more than that. My position enabling me to watch results. With one pugging the brick would be streaked, although the clay was fine enough to cut freely. With the second pugging the brick would come through thoroughly mixed, and burn the desired color.

This led to a great deal of thought upon my part. I then learned for the first time that, if I had thoroughly understood this idea of mixing clays and pugging completely, a disastrous failure, that had overtaken me a few years previous, would have been avoided. There is no doubt a great many disappointments to expectant beginners, which come about in the same way.

Clay must be thoroughly pulverized and pugged to make a first-class brick. More especially if there are small stones or, as is often the case, small particles of lime. I remember of seeing clay used for red brick. The clay had been stripped off a bed of lime-stone. Hardly a brick came from the kiln without a small hole or two, caused by the lime-stone burning into a lime and being confined just under the shell, would eventually burst out a space and leave a hole in the brick. Small stones, as most of the craft know from experience, will also crack the brick and leave an ugly looking face. Hence a good crusher is an absolute necessity to reduce the clay. Then good, thorough pugging, and burning carefully, makes the best building material we have.

In my letter to the CLAY-WORKER for June you say, or rather make me say: "The pitch is *pounded* into the crevices." It should read *poured* (while hot of course).

Our pavements are looking nice this summer, although I notice a few low places in the part that was layed without pitch. Perhaps though this is caused by an uneven foundation.

If you will allow me a little more space, I will try to explain why my personal preference for other colors than red for brick, on account of latter whitewashing so badly, is so strong. This may only be a hobby of mine, but I contend that when parties go the expense of putting in a pretty front to a building, (and it is expensive), it is a great disappointment to see, in a short time, that the whitewash comes out and makes the building look as though some "Colored" artist had been going over it

with a bucket of lime and a broom.

I am in receipt of a communication from a prominent brickmaker of Akron, Ohio, who, having read my letter to you, in current issue, says, his firm are making a pressed brick from shale rock, that he thinks makes the best brick in America, and with an "analysis that shows no grounds for white-wash," still they have to contend with this destroyer of the beautiful. My correspondent thinks a change of colors will not avoid the difficulty. My experience in making mottled or pompeian brick was, that I have the first front to see of that material that has shown signs of white-washing. Please do not infer that I am fighting the red brick men. My only object in discussing this is to find out, if possible, whether a remedy can be found.

We used, at Amboy, a certain proportion of free-stone to each section of clay put up. This was said to overcome the alum in the clays

There is no doubt as my correspondents claims, that the atmosphere has something to do with it; but what is it?

There is very little building going on here, as "ile" is too awfully low to allow the "noble" producer much margin to build palaces with. However, after those Chicago brickmakers who, I understand are burning their brick with Lima crude oil, use up the stocks in that district. Perhaps we will not have that hatchet hanging over our heads, and will get better prices for Pennsylvania crude. If said Chicago Brick Manufacturers' do have to return to coal or wood, then our town will boom again as in the past.

Quite a number of fine buildings are contemplated in Pittsburgh, but I suppose, as usual, stone will have the preference.

Brother Crary is about right in his remarks about what class of material should be printed in a Journal like yours. CLAY-WORKER means a great deal, and as I have already said in this letter, *mixing* and *pugging* is the main part or the beginning of making a good brick; so if you get ideas from all over the Union it cannot but be of value to your many readers.

Please excuse me for this remark. I am astonished at the fine appearance of the men whose pictures you print each month. Brickmakers do not lack for good looks at any rate. You must understand, of course, that at the present time *yours truly* is out of the

harness; so please do not think that my "phiz" would flatter the craft any.

I pity those poor devils who depend upon the sun to dry their bricks, for we have had very few clays this year that would even allow of digging the clay let alone dry it in the form of a brick.

I notice the death of Mr. Fisher of Metuchen, New Jersey, of Sayer & Fisher. Their plant was only a few miles up the Raritan from Amboy, and what a lot of "small poxed" brick we used to get to build kilns with from their place! You see it rains in New Jersey as well as in Pennsylvania.

W. R. OSBORNE.

Philadelphia News.

Editor Clay-Worker:

The building trades of Philadelphia have been lucky this year, in escaping worse Labor troubles. The first half of the year has been a fair one in building activity, and the last half is going to be better. Builders who can complete, an operation within 2 or 3 months, feel safer in waiting until after July, to begin. There was a good deal of caution, shown during the early part of the year, but now everybody is hurrying up, and as our letter shows, there is quite a booming demand for brick, tile, shingles, plaster and everything going into building. Even the iron trade, reports quite a booming demand for structural material, and every buyer is in a hurry. Speaking generally it looks as though we would have a very good half year. The general commercial situation is all right. There is no complaint about not being able to get money to push work. The labor men have behaved themselves. Capitalists are a little freer with money than they were 2 or 3 months ago; people have stopped talking about the high water mark, of building in this city. There are very few "To Lets" or "For Sales". All we want is a rapid transit system, by which we can jump from 430 Walnut St. to 50th. or 100th. St. in a few minutes. There is a good deal of land, in the Northern end of the city, held for building purposes, and it will soon be covered with brick and mortar.

The only labor trouble of any consequence occurred, the other day at Dobbin's Works. About a week ago a committee representing the journeymen, stated their grievances to Mr. Dobbins, and demanded an increase in pay amounting to about 25 cts. a day. To this demand Mr. Dobbins, turned a deaf ear, in consequence of which, all hands, like

the bees began to swarm where they had the best opportunity to make the most honey. At the present time the price of brick is so low that there is scarcely any profit in the business.

The volume of business this season has been far in excess of the same period last year; however, competition is so keen that when a job of any size, is within sight all hands are after it, like a set of wolves, and when the contract is given out, there is not much margin to go or come on, for the one who considers himself the lucky fellow.

There have been a greater number of buildings erected so far this year, than in same period of 91, and more fine brick is called for, consequently more money has changed hands. Nearly all of the specifications for large contracts call for buff or other fine brick. Betz new building, Broad and Penn Square, to be thirteen stories in height, will be of buff brick. The Jarden Brick Co. are as busy as they possibly can be, and are delivering about 3,000,000 brick a month. The sale of their fine brick has also been very heavy. They have all their wheels running on fine brick. This Company bid for the work on the new Reading Building, but with drew when they found the specifications to call for a special shade buff, which they thought could not be run evenly. The Perth Amboy Brick Company were awarded the contract, and the specifications were changed, to call for a pink brick. The Jarden Co. are doing a great deal of work through the State, at Reading and other points, and have recently added a new Boyd press to their plant.

Frank M. Butterworth, former book-keeper for Murrell & Dobbins, has embarked in the brick business at Claymont, Delaware. The style of the new company will be known as Comstock and Butterworth. They have secured the Richmond Works with a complete plant, and the clay, is said to be first class. Mr. Butterworth has had quite an extended experience in the business having served an apprenticeship with his uncle in Indiana. The new firm has the best wishes of the trade in general.

Wm. B. Reitmeyer has leased for five years, the brick yard at Pottstown with seven acres of land, to Lewis B. Reifsneider, David Endy and Jacob B. Hartenstine, the new firm to be known as L. B. Reifsneider and Co. This firm has the contract for 100,000 brick for a new Opera House at that place. Mr. Reifsneider operated the brick works fourteen years,

manufacturing 600,000 to 1,200,000 brick per year.

A New Jersey pottery firm is making a great many specimens of fine work for exhibition at the Chicago Fair. One piece already completed, is an elegant vase, 40 inches high, and 52 inches in circumference, valued at \$1,000. This is thought to be one of the most perfect and beautiful specimens of the potter's art ever produced in this country.

The new combination of potters, to be known as the Trenton Pottery Co. has gone into effect with a capital stock of \$3,000,000 the common stock being \$1,250,000. The potteries included in the Combine are the Empire, operated by Alphaugh and Magowan, the "Crescent" by Cook and Hancock, the "Delaware" by Oliphant and Co. The "Equitable" by Leuckel Coxon & Co., and the "Enterprise".

The real and personal property of the Atlantic City Tile and Brick Works has been sold at Barkersville, by Senator Gardner, the price realized being \$17,000. The purchasers, were Atlantic City capitalists.

Samuel Mc Lenahan of 1807 Fernon St. had his left leg torn off by a grinding machine, at the Jarden Brick Works recently, and died at the Polyclinic Hospital. Mc Lenahan, who carted clay to the large feeder in the works, was preparing to dump a load into the machine when he slipped and fell between the revolving cog wheels. His left leg was crushed off above the knees. The machinery was quickly stopped, and the man was sent to the hospital, but all efforts to save his life proved futile.

The John Porter Co., of New Cumberland, W. Va., the great paving brick manufacturers, have lately had great trouble in getting laborers about their various yards. Many of their hands being farmers, quit the yards and went to harvesting, leaving the company short handed. On account of a scarcity of workmen about New Cumberland, they have put a great number of Italians at work. This company employs about 700 hands, and has a daily output of 200,000 brick. A late rise on the Ohio River enabled them to ship the last of a large contract for Evansville, Ind., by water.

If you want anything you haven't got or have something you don't want, read or advertise in our "Wanted, For Sale, Etc.," columns.

A Kentucky Paving Brick Plant.

Editor Clay-Worker:

Last year this place sprang into life by the introduction of a Paving Brick Factory. After a short while, certain influential gentlemen from Louisville visited the place and purchased land for a prospective brick and terra cotta plant, to be called the Acme Vitrified Brick Works. As wise men, they were slow to make haste, the wisdom of which is already demonstrated. A Mr. Patton, of Montreal, Canada, also visited the place, purchased land, and now has a splendid plant just commencing operation.

The Acme Company, early in March, began building their plant, securing the services of an experienced man to design the plans and erect the plant, they proceeded without delay to build the works and open up their shale bank. On visiting this place, the writer was struck with its position and beauty, standing upon a beautiful piece of table land into which a side track has been made from the Louisville, St. Louis and Texas R. R. It also faces the Ohio River on the north, surrounded by beautiful hills and enchanting scenery. A mining engineer, from London, England, on paying the superintendent a visit, remarked to his associates that in all his travels he never saw a brick works erected before in the center of a beautiful park. The chief and most satisfactory feature about the concern is, that all the directors, while men of means, are also men of sense, a combination that insures success. They began right by putting in ample steam power, having 300 horse power boilers and 200 horse power engine. All the clayworking machinery, capacity 60,000 to 70,000 per day, was supplied by the well known firm of Frey-Sheckler Company, Bucyrus, Ohio. This company also furnished the machinery for both the other brick works in this town.

The company have just erected and had the first burn in one of Mr. Eudaly's kilns, and it was a great success. The kiln is a large one, being 18x82 in the clear, holds 200,000 and cost \$4,000 to build. It was erected and the first burn made under the direction of J. T. Underwood, an experienced burner in Mr. Eudaly's employ. The result is very satisfactory, fully 95 per cent. of the brick coming out first-class pavers.

The Dryers consist of 20 tunnels, heated by steam. While they are constructed upon certain novel principles

for economy of steam, and to obviate the cracking of the brick, which is peculiarly characteristic of the Cloverport shale. They are not patented. They are designed and erected by the superintendent himself, who was one of the first to use the tunnel driers in England 26 years ago. He informed the writer that the idea was first suggested to himself while enjoying the luxury of a Turkish bath, heated to 180 degrees by hot air, in Sheffield, England.

The officers of the Acme Vitrified Brick Company are, Charles R. Long, president; Fred Hoertz, vice president; Louis Summers, secretary and general manager, and Alfred Morgan, superintendent. The directors, I am informed, are among the most wealthy and best business men of Louisville, and as that city will be the principle market center, no doubt they will be able to command a good trade.

Cloverport, Ky.

TRAVELER.,

Signs of Progress.

Editor Clay-Worker:

I see the discussion, "Machine vs. hand-made brick," which was carried on in your columns a year or two ago, has been renewed under the title of "Old and New Methods." A fairly correct estimate of the progress machinery has since made can be arrived at by a comparison of the two discussions.

The principal champions of the hand system in the old controversy were "Village Brickmaker," and "Kali." The new discussion is opened by "Village Brickmaker," who tells of a man who bought three machines, etc., at a cost of \$15,000, and had an extra yearly expenditure of \$2,500 for superintendent, etc., and then only made the same number of bricks he had always made by hand, 1,200,000, without any of these outlays. The weakness of this letter (so unlike the same writer's previous one) is proof of the entire lack of argument in favor of the old methods, while "Kali" we have actually posing as a testimonial letter writer for one of the despised "sausage stuffer" machines mentioned in "Village Brickmaker's" letter. Evidently Kali's motto, "He got the wrong machine," does not apply in his particular case. In addition we have all the principal "old hand-made fellows" unanimously declaring (strange to say, some of them with regret—it is incomprehensible to me why anyone should

want to make brick by hand) that the day of hand molding has gone, never to return, and many of them are even putting in artificial dryers. Are not these "signs of the times," and many others, too numerous to mention, which are daily forcing themselves into notice, ample warning for those still trying to make brick by hand to leave the sinking old ship, which President McAvoy declared, in his closing address at Indianapolis, is surely being scuttled by the inventive genius of the machine manufacturers.

The very fact that these brethren have been forced, against their will, to introduce machinery is the very strongest argument possible in favor of it.

In close relation with this subject, is it not a noteworthy fact that complaints of bad times, etc., come principally from districts where not only the "old sunshine method," with all its antediluvian accompaniments (open yard drying, with its heavy labor bill and large percentage of lost and damaged brick, and temporary clamp, burning with its heavy fuel bill and large percentage of lost and salmon brick) is openly advocated, but where anything in the form of improvement (patent dryers and patent machinery) is attempted to be held up to ridicule. It is also a curious coincidence that these districts are those most poorly represented in that great school of progress and prosperity, the N. B. M. A.

Facts, Mr. Editor, are stubborn things—"hard nuggets"—and I do not think it can be denied that the prosperous brick manufacturers in the country are those who have adopted "new methods." It appears to me that those who advise to the contrary, however sincere their motives, are doing but doubtful service to all who are foolish enough to be influenced by their opinion.

R. M. GREER.

Tuxpam, June 23, 1892.

Brick Industry at Ogden, Utah.

Editor Clay-Worker:

The brick industry here may be called fair, yet does not present the usual prosperous condition. Have inspected nearly all the brickyards, and a personal interview with the proprietors has developed the following condition: L. J. Bucher employs 22 hands, and will make about 1½ million, including 75,000 repressed; made 2 million last year; will make 15,000 fire brick. Operates a

Creager's Sons soft clay press and two repressing machines.

Mr. Calbert employs 12 to 16 hands and will make 1 million, including 100 thousand repressed.

Mr. Greenwell has not started work yet, but may make 200 thousand. W. S. Parker employs 3 men and will repress 75 thousand and make a total of a half a million; operates one repressing machine. B. Flint employs 5 hands and is turning out 9,000 per day and will produce 350,000. W. J. Stephenson employs 10 to 11 hands, turning out 10,000 per day and will produce 1½ million. Anderson & Hurd employ 8 hands, turning out 6,000 per day and estimates half a million of slop brick for the year. Jos. Crawford also employs 8 hands, turning out 7,500 per day, and will produce 1 million slop and sand rolled. Mr. Bailey's yard will produce 200,000 repressed brick; where not specified, all brick are sand rolled.

Have not received any reply to a note addressed to Anderson Pressed Brick Co., but as they are the heaviest manufacturers, will doubtless turn out not less than 4 million, which will make a total of over ten million for the year, which is a very good showing for these dull times.

This city will spend 95,000 dollars in new public school buildings this year. There are now under contract two eight room and three four room buildings, which, including one recently finished, will supply a total seating capacity for two thousand pupils. The buildings will be provided with the best modern improvements in heating and ventilation, as nothing but the best will be accepted.

F. A. CALKINS.

St. Louis and Vicinity.

Editor Clay-Worker:

A question which is beginning to force its attention on the local brick-makers is, the failure of the clay supply around their present locations. Some few yards have enough to last for several years yet, but others will have to secure new locations within one, two and three years. The supply at the Hydraulic yards No. 4 is about exhausted now, and they are already using clay brought from Ferguson, a suburb about fourteen miles north of the city, where they long ago purchased large tracts of desirable lands. Their yard, No. 1, will run out next year and will be moved.

Mr. Anthony Ittner has a fair supply at his yard, on California Ave. and

Sidney Street, which will last about two years more, but he has taken time by the forelock and secured land about eight miles east, all first-class clay. This matter, together with the cheapness of fuel, were among the impelling causes which prompted Mr. Ittner to establish his Belleville yards.

The Illinois Supply & Construction Co. are also well supplied at Collinsville, Ills.

This last named concern are cutting quite a prominent figure in the trade. They have just secured a contract for a large job on 6th and Chester Street, which calls for about 500,000 buff brick.

Their new yard at Collinsville is making rapid headway, and they expect to have it in operation in about thirty days. Some of their kilns (the Grath up and down draft) are already being topped off, and the press will be all set up within a couple of week's time.

The big item of interest in the past month is the formation of the St. Louis Paving Brick Company, which was incorporated under the Illinois laws, with a capital stock of \$250,000.00, all to be paid up in cash. The incorporators are the stock-holders of the Hydraulic Press Brick Co., St. Louis, and the Purington - Kimbell Brick Company, Chicago. They will build a yard at Collinsville, where they have secured considerable ground. It will be modeled closely after the Purington paving brick works at Galesburg, and as soon as the organization is completed, active work will be immediately begun.

Happily for the brick men, June was a hot, dry month, and vast quantities of dry clay was shedded, thus relieving the apprehension felt on this score owing to the incessant wet weather of the preceding months.

The Hydraulic Press Brick Company report sales during June, to have been remarkably heavy, their country trade being especially good. They are now shipping heavily all over the country, from Duluth to Galveston, and Tacoma and Seattle, Wash., to New York.

The two big jobs occupying the minds of the brickmakers here are, the new \$1,000,000 Hotel and the Union Depot. Isaacs & Nell are architects for the former, and Theo. Link for the latter.

The Barnett Brick Works had a \$2,000 fire at their yards, Newstead Ave. and Wabash R. R., Sunday, July

3. The cause was the collapse of the roof of a burning kiln. The loss is fully covered by insurance.

Anthony Ittner is a sincere believer in a patriotic celebration of Independence day, and in the big celebration here, on the 4th inst., did his share to make it a success. He contributed liberally to the fund to cover the expense, marched in the ranks over the whole distance in the morning, and attended the monster celebration at the Fair Grounds in the afternoon.

An attempt was made in 1877 to make a celebration of this character a permanent institution, and Mr. Ittner was, in that year, president of the Executive Committee. The efforts of the committee were ignored by the press and the "influential citizens," but in spite of all obstacles, the movement that year was a brilliant success. The task was a mighty one, however, and no one could be secured the following year to accept Mr. Ittner's position, and the movement was accordingly abandoned.

Prices have gained no strength whatever with the advance of the season, but on the contrary, show only a weaker tendency.

Mr. Simpkins, of the Union Press Brick Company, is summering at Cape Cod.

Mr. E. C. Sterling, of the Hydraulic Company, is in Europe.

Mr. Chauvent, of the same company, is spending his vacation at Lake George.
E. L. M.

A HINT TO ADVOCATES OF PAVING BRICK

While brick pavements are, as we believe, superior in every way, to the so called Asphalt Pavements of our City, we are not disposed to make any accusations against our board of Public Works who certainly show a great favoritism for the trinidad mixtures. It is our belief that the Board of Public Works thinks that it is doing the right thing, and that in the multiplicity of their duties, they are not fully in a position to determine all facts with relation to paving work. We think that the attitude of our Board of Public Works is typical of many others. It is the kind and right thing to give them credit, for good intentions. At the same time it is the business of those interested in brick paving to vigorously set forth facts so that when it comes to the question of deciding in the matter of

pavements, those who have this work to do, may do it with full information. We recently spoke to one interested in the manufacture of clay and brick, who had all sorts of vigorous accusations to make against the Board of Public Works. He is a man of great energy and ordinarily very intelligent, whose abilities, if directed to setting forth the advantages of brick as a paving material, instead of decrying competing materials and criticising those in authority, could not but wield a certain influence.

DRY PRESS PAVERS.

The McDonald Brick Co., of Louisville, Ky., whose plant was recently struck by lightning and partially destroyed, are among the pioneers in the manufacture of vitrified street paving brick by the dry press process. They have met with remarkable success. Sixty to eighty per cent. of their output is readily accepted for street pavers, and the balance for sidewalks. They claim that the dry press street pavers, when laid side by side with pavers made by the wet process, wear better and are in every respect superior. They are using the Boyd Press and the Flood Kilns, and attribute their success in burning largely to the peculiar construction of these kilns. Their manager states that on opening the last kiln (180,000) they were seriously embarrassed to find thoroughly vitrified pavers from top to bottom, leaving no rough, hard brick to apply on their sidewalk contracts. He also says that in rebuilding their plant they expect to double their capacity. The manufacture of dry press paving brick, though still in its infancy, appears to be a very healthy and vigorous infant.

LILIPUTIAN BRICK.

We are indebted to R. B. Smith, of Chicago, for a box of specimen brick that are rather unique, in size, at least, being 2x1x $\frac{3}{8}$ inches. However, they are nicely formed, in fact, perfect toy bricks. Mr. Smith makes a specialty of testing clays for the purpose of determining their value for brickmaking purposes. Included in his equipment for this work, is a small working model of a brick machine, with which the clay is formed into brick of the size named and then burned. In this way Mr. Smith can determine, in a practical manner, the value of any particular clay, demonstrating the color it will

burn, texture, etc. The samples are numbered, and from a list which accompanied them, we are advised that they are made from clays from ten different states. Any of our readers who may want a few souvenir brick made from their clay, can secure them by sending a small package of clay to Mr. Smith, who has an advertisement on page 50 of this issue.

ASPHALT NOT A DURABLE PAVING MATERIAL.

In nearly all of the cities of this country streets are being paved with a material called asphalt. It is made with about ten per cent. of Trinidad pitch, and a mixture of tar, gravel, sand, limestone, etc., and is said to be asphalt. In none of the European countries is this material used for this purpose. In England, France and Germany, asphalt is used for the purpose of making asphalt pavements; never mixed with pitch, gravel, sand or other ingredients. While this material has been tried a few times and pronounced a failure in foreign cities, all but the record of the experiment is now unknown. What is asphalt, may be asked. Where does it come from? It is minute particles of lime rock surrounded with and impregnated by bitumen. In its natural state it is a rock. When it is to be used for paving purposes this rock is ground up into a powder, is heated and compressed with rammers over a concrete foundation. When it is put on the street, it is a dry powder, and under compression it becomes solid and hard. It is found in France, Switzerland and Germany. It is said that there is rock asphalt in this country, but it has not been developed. Trinidad pitch is not recognized as asphalt outside of this country, nor is the Trinidad pitch and gravel composition used as paving material outside of this country. The brick pavements which are being put down in this city are outlasting the composition pavements, and are in every way superior to them.

The proceedings of the last annual convention of The Ohio Tile, Brick & Drainage Association have just been published in neat pamphlet form. The report is full and complete and contains many things of value and interest to clayworkers. A copy will be sent free to every Ohio brick and tile-maker who will send his address to the Sec'y, I. M. Justice, North Baltimore, O.

THE CLAY-WORKER.

OFFICIAL ORGAN OF THE NATIONAL BRICK MANUFACTURERS' ASSOCIATION OF THE UNITED STATES OF AMERICA.

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Correspondence on all subjects of interest to Clay Workers is solicited. Communications from practical men will always be welcome. Address all communications to

T. A. RANDALL & CO.,

81 Massachusetts Ave. Indianapolis

WORDS AND WORKS.

A trade journal, is not only a magazine of trade literature, but should be a scientific journal, a trade news journal, and a means of communication between different branches of the trade through its reading columns, and as well, its advertising columns. The latter feature of a trade journal is by no means the least interesting, and the least valuable, as giving specific and definite trade, technical and commercial information. The CLAY-WORKER, in its life, has done its part in helping many prosperous manufacturing establishments to the front. We can look over the back numbers of the CLAY-WORKER, and read in its advertising columns, the history of the development of clay working machinery. We feel that we have done not a little in bringing these various establishments to the attention of the people. We do not believe that we are carrying advertisements of any worthy device, which is not benefiting both the reader and the advertiser. The volume and character of the advertising in this journal indicates its value. There is no one with us in the capacity of advertiser but feels that he is getting more than value received. We said something in the last number of this journal about holding fast to that which is good and the desirability of avoiding experimental advertising. The record of the CLAY-WORKER, the character of its business, and its results, places it in an indisputable position. There can be no question about the facts, and there is no

reason why we should not state them. Those who are with us, and have been with us in the past, have done their part in helping to bring this journal to the front as we have done our part in helping to bring the advertiser to the front. We appreciate the desire for constant improvement and feel that in adding to the value of this journal, we are not only benefiting the individual readers, but the advertisers and, of course, ourselves.

We are firm believers in the truth of the old adage, that actions speak louder than words, and ask our readers, and patrons to judge us by our work, and its fruits rather than by wordy statements. If the trade will but read with discerning eye, and hold fast that which is good, none need go astray.

LABOR TROUBLES.

As we write, the sensation of the hour is the mob disturbance at the steel works near Pittsburgh. It is a libel upon labor and labor organization to speak of these outrages as "labor troubles," and we use the phrase in this article only to repel the insult which its popular use offers to an honorable and useful organization of honorable and useful men. These outrages are nothing more or less than the legitimate outcroppings of the spirit of anarchism which has grown so fearfully in this country within the last quarter of a century, under our unwise immigration policy. What may have been wise and proper when the bulk of immigrants were industrious and frugal men, who took up and cultivated our unoccupied lands, or engaged in other honorable avocations, which, while affording them ample remuneration, enriched the country pecuniarily, and blessed us with a population of sturdy and honest men, and patriotic citizens, is to-day a most dangerous and suicidal policy, when the bulk of immigrants are from the slums of European cities, and for the most part are anarchists of the most dangerous type; who congregate in cities, and, through international communistic associations, get the control of labor organizations, and thus give their dangerous political heresies a respectable planting, while they practically exclude American youth from the most honorable and the most profitable avocations. Some, with a brazen face, that would shame even the prince of darkness, in his attempt to promulgate divine truth, at once give themselves to the open promulgation of

the most dangerous form of anarchism even before, through perjury, they don the robes of citizenship.

In this disturbance the question of wages plays but a minor part. It is simply a question of possession. It is not difficult to foresee the result though no human ken can at the time of our writing foresee the possible devastations through which the end is to be reached. Though we are largely in the hands of anarchists it cannot be possible that the civil authorities of Pennsylvania will allow them to take possession of the property of the mill owners and either destroy it by fire or keep it in idleness. Before this reaches our readers some conclusion will have been reached and the relative strength of the State and the anarchists will have been tested, for that is all there is in the issue. At the time of our writing the property involved is in the hands of the State constructively, though in the possession of the anarchists; the owners having abandoned their purpose to protect it by men hired for that purpose at their own expense, seeing that a dozen or more of their employes were killed or badly wounded in the attempt.

No American citizen can deny the right of any man to quit work whenever the terms of employment are unsatisfactory, but no living man, or set of men has a right to take possession of another man's property without due process of law, and that is what these anarchists have done and the demagogue who gives them aid and comfort, by an attempt to justify their course under the plea that it is a struggle of labor against capital, is too dangerous a man to be entrusted with public office. It is simply bald anarchism. It is in no sense a "labor trouble," it is the demand of the highwayman to stand and deliver.

SKILL AND PROFICIENCY RARE.

"It is hard to get a job," said a young man to us the other day. "Can you lay brick?" we asked him. "O, no, I can't lay brick," he said. "What can you do?" we asked. "Most any kind of work; most anything." "Are you a carpenter?" "Not that kind of work," he said, "I can do any kind of work around an office or a store, but I haven't any trade." "Can you keep books?" "No, I never learned to keep books." "Can you sell goods over a counter?" we said. "No, I never did that." "Where did you work last?" "The last work I did, I was handing out

checks to teams as they hauled gravel off the street. The number of checks determined the amount of pay they were to get at the end of the week. "What did you do before that?" "Why—I was boss of a roustabout gang in a flour mill." Here was a man in the midst of the most prosperous season our city has ever known, out of a job. As a matter of fact he did not know how to do anything. He was not disposed to do manual labor, and he had no special knowledge of any subject. Good workmen of all kinds are scarce all the time. This is true in hard times and more so in good times. It is always difficult to get thoroughly capable help in any line of work. One who has charge of a business block told us that in the course of a year he has to handle over a dozen elevator boys, and that only one or two of them gave good service. Those who employ men and women in offices know that skilled help is always very scarce and always in demand. One who can do anything well, no matter what it may be, one who has special knowledge and is industrious, can always get a good job. There is a good deal more good brickwork to be done in this city than there are good bricklayers to do it. This statement is equally true with respect to carpenters, iron workers and all other mechanics.

ENTERPRISE.

Just seven days after the disastrous fire which practically destroyed the works of C. W. Raymond & Co., at Dayton, Ohio, they had cleared away the debris, erected new frame work to their buildings, put in new machinery and by the assistance of two Portable Engines, resumed operations. At this writing they are in as good working shape as before the fire and but a few days will elapse before they will be running a greatly increased force to compensate for lost time.

This is a stroke of energy scarcely equalled, but was necessary owing to the accumulation of orders on hand at the time of the fire.

BURLINGTON ROUTE NEW SERVICE

A through Pullman Sleeping Car, Chicago to San Francisco, is a feature of the Burlington's new service. This car leaves Chicago daily on the fast train, at 1:00 P. M., and runs via Denver, Colorado Springs, Leadville, Glenwood Springs, Salt Lake City, and Ogden, arriving in San Francisco at 11:45 A. M., less than four days enroute.

EDITORIAL NOTES and CLIPPINGS

Markle, O., is to have a large brick plant.

Shawnee, Ohio wants a brick and tile factory.

Hiram Blanchard will make brick at Eastport, Me.

John Clemmer will operate a brick yard at Beatrice, Neb.

Chas. Dale contemplates establishing a brick plant near Canfield, Colo.

A fire brick plant is to be established at Nanaimo, Vancouver Island, B. C.

There was an \$1,800 fire at Redman & Dunn's brickyard, Pittsburgh, June 20.

W. L. Kasting, Seymour, Ind., had a \$5,000 blaze at his brick works the 7th inst.

A company has been organized to establish a tile factory near East Greenville, O.

John Hickson & Co. will add new machinery to their plant near Lynchburg, Va.

The Marseilles (Ill.) Fre-proof & Terra Cotta Co. has been incorporated. Capital, \$50,000.

Chas. Baker, proprietor of the Flower Valley Brick Co., Fremont, O., died June 27, aged 45 years.

The Hamilton & Toronto (Ont.) Sewer Pipe Works had a \$1,500 fire June 25. Partially insured.

The plant of the Vitrified Pipe Co., at Bridgeport, Ct., has passed into the hands of a receiver.

Dyer Bros., Greenfield, Mass., are going to enlarge their brickyard to double the present capacity.

C. F. Tracy is making brick at Vincent, O., and will also make drain tile soon as he can fit up for it.

The plant of Kinsella & Co., Chicago brickmakers, at Hobart, Ind., was burned June 14. Loss \$20,000.

The dryer at Egelhoff's brick works, Louisville, Ky., was burned the 5th inst. Loss, \$1,500; insured; cause, incendiary.

The tile works of Wilhelm & Kanaga, Wilmot, O., were demolished the 30th ult. by the explosion of the boiler. Loss, \$5,000.

The Markle Fire Clay Co., of Markle, Jefferson county, Ohio, have let the con-

tract for their buildings to Toronto contractors. They have their clay shaft about completed, and hope to be making sewer pipe before late in the fall.

The Covington, (Ky.) Pressed Brick Co., has been incorporated by H. C. Farmer, J. P. Hall, Geo. Glenden and others.

Wm. Miller, of Uintah, Utah, has a valuable clay mine near that town and will probably establish brick works there.

Mathew F. Owens, an old time brick-maker, died at his home in North Adams, Mass., June 6th., at the age of 50 years.

R. M. Kearns & Co., Adel, Ia., will enlarge their brick and tile works, as they cannot now supply the demand for their ware.

Mr. Atkinson, a contractor of Eldora, Ia., has purchased the Eldora Tile Works and will add a brick machine to the equipment.

Mr. M. Mullen, of Athens, Wash., has been making experiments with some clay, and will erect a brick plant as the results are very satisfactory.

R. B. Wheaton, Middleburg, Ct., died June 17, aged 77 years. Deceased was one of the oldest and best known brick manufacturers in New England.

The Owensboro, Ky., Sewer Pipe Co. turned out their first kiln of ware June 6, and was much pleased with the ware, which came out in fine condition.

The Des Moines (Ia.) Register claims that there is a need of a good front brick plant there. A good supply of excellent clay is found near the city.

The Ohio Valley Fire Clay Company, of Toronto, is adding another steam sewer pipe press to their equipment in order to meet the demand for their pipe.

The Empire Fire Clay Co., of Empire, Ohio, is running double turn making building blocks, for which they have an immense contract for Pittsburgh parties.

Mr. Chas. Freeman, of Freeman Fire Clay Co., Freemans, Ohio, has patented a flue die for a steam press which will revolutionize the making of this material.

The Central City Brick & Tile Co., of Peoria, Ill., have just started a four-mold Simpson press, purchased through D. B. Drummond & Co., of St. Louis, Mo.

THE CLAYWORKER.

THE OFFICIAL ORGAN OF THE NATIONAL BRICK MANUFACTURERS' ASSOCIATION OF THE UNITED STATES OF AMERICA.

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No. 2

Written for the Clay-Worker

A SPECIMEN OF GERMAN BRICK ARCHITECTURE.

ANYTHING which may be done to advance the cause of good brick work advances the interest of the brick

Hamburg the same thing is to be noticed. In Amsterdam and many of the Holland cities the canals are lined with brick. These people are thorough in their constructive methods. They do nothing of which they are not certain. With evidence of this kind before us, we may

raised a great cry. The owner was greatly disturbed and those people who take an interest in everybody's business were horrified. It took a great deal of explanation and time to convince those immediately interested. The recent experience in building rubble walls has



THE BOOKSELLERS CASINO, LEIPSIG, GERMANY.

maker. We find in the Old World certain uses for brick which are not common with us: In Havre, France, we find sea walls laid up in brick, and the foundations of many of the heavier structures made with that material. In

know that the ordinary constructive uses of brick may be enlarged. A few years ago the writer was engaged in the construction of a large apartment house. It was winter, and instead of making his foundation of stone, he used brick. It

emphasized the statement that foundations made with good hard brick laid with ordinary care are superior to stone foundations. The advantages of brick foundations are that they have equal solidity throughout; that if there is a set-

tlement, it is universal. On the one hand it requires great skill to lay up a stone wall so as to secure a fairly good foundation; on the other, it is hardly possible to lay up a brick wall so that it will not make a good foundation. Of course there are extreme cases where the outside and an inside wall are laid up and the brick, thrown in from a wheel-barrow; but it is pleasant to be able to state that such criminal performances are unusual, and that this practice dates back to the boom times of a few years ago and is now quite rare.

Not only is it in the matter of the structural use of brick that we may learn many things from our foreign neighbors, but also in their decorative use. These people have a larger number of architects to do a given amount of work. Consequently the architects have more time; they study their work more thoroughly, and the result is what we see. In some of the German provinces stone is dear and brick is cheap. Great thoughtfulness is commonly given to the use of stone, and interest is added by the decorative use of brick. The illustration shows the Booksellers Casino in Leipsig. While the general style of the architecture may not please all alike, it is interesting, and is conscientiously and carefully carried out. Every detail is well studied and the relations of the different parts carefully considered. In this respect the work is an object lesson in thoroughness, than which lesson none is more important to the American people. With all our splendid qualities, inventive, constructive and otherwise, there is a haste and often an evidence of superficial construction which shows itself in a great deal of our work. While the Americans are no doubt showing greater ability in the manufacture of brick, inventing more machinery and making better brick than other sections of the world, it is well to understand that the Germans, the French and the English, are more skillful in laying them than is common with our people. Not but that we have certain examples of high class brick laying, and those that compete in value and interest with those of any section but such structures are exceptional. They stand out distinct and marked. Brick work of a high class is not common. It is not universal. It is all the more shame that we should know so prominently and conspicuously of the good work which is done and yet do much that is ordinary.

A great deal of our brick work for use in average structures is bad indeed. The exterior is carelessly put up, the color indifferently selected and only a slight regard to the carrying out of the plans. Constructively, the least said the better. Many architects are compelled to over-look the work which is constructively bad, because they know that there is no possibility of having it improved. The habits of indifferent brick laying are so formed that any change would require an amount of time and energy which no man of ordinary means could afford to put into his brick work.

Architects have about shut their eyes to a great many things in brick laying. For instance: Take the laying up of a twelve inch wall. The brick layer will lay up the outer course, say to the height of six courses; then he will lay the middle course and the one on the inside of the wall at the same time, but keeping the middle course ahead of the inside course. He pushes the middle brick close to the bricks forming the outer layer of the wall. This leaves a larger space between the middle course and the inside course and practically no space at all between the middle course and the outside course. It is the habit of the very large majority of brick layers to push the middle course of brick up against the outside course so that the space between these two courses is practically dry and with a large filling between the inside and the middle courses. The right idea in brick laying is to have all of the brick entirely surrounded by mortar excepting that part of it which is exposed to the outside or the inside of the wall. In ordinary brick laying the middle course of brick has mortar on the bottom and the top but not on the outside edge or at either end. The mortar which comes in contact with these parts is merely accidental. There is the bed joint which has mortar, but the vertical joints and the one next to the outside course of brick has very little. Nine-tenths of the brick which are laid in this part of the country are handled in that way, and there is no architect who can superintend his work closely enough to break up this habit. It is part of the trade of the brick layer to lay brick in this way and there is very little to be gained by objections. The architect may ask that the work be done in a particular way. He may ask that the work be slushed, and that there shall be mortar in every joint, but as the brick layer has been educated to do

it differently, what the architect has to say makes very little impression on his mind. There are many specifications which read that "the wall shall be laid up full width at the same time," but unless the architect stays with his work all the time this will not be done. It is not the practice to pay the architect enough so that he can afford to superintend his work that closely; thus it is that the old habit continues. Some architects are undertaking to circumvent the habit of laying up the outside course and filling in by introducing the Flemish and Old English bond. In this way it is necessary to lay up the full thickness of the wall at the same time but this is strenuously opposed by brick layers. The writer has in mind one young architect who made himself a great deal of trouble by undertaking to have a wall laid in that way. He specified a Flemish bond and illustrated carefully what he meant. Nothing was said about it until the time came to lay it up; then the brick layers began in their usual way. Six courses of stretchers and the seventh course was a bond course. The young architect objected. The brick layer, who was a very suave, easy-talking man, said: "You certainly do not want that kind of a bond. It won't do for our tall buildings; it will do for a little, low building of the kind they build on the other side, but it won't do for a tall building like this. I would not lay up this building Flemish bond for a thousand dollars. It would be against my reputation as a brick layer." Nevertheless, the architect insisted and the owner of the building came on the ground to see what the controversy was about. The young architect explained. Then the brick layer said, in an easy way: "It won't do sir. I have been laying brick for forty years and have never had any trouble, but I know if we put up this building with this kind of a bond, it will tumble down, the first little wind storm that comes along, and it is against my reputation, and against the interest of our young friend here to put it up in this way. If I were in his place, not for five-thousand dollars, no, not for ten, would I allow this work to be laid up with the Flemish bond." The owner was impressed. The young architect was a little bit excited, as young men frequently are under such circumstances, but he worked, and worked hard in this matter for a couple of days, and in the course of that time succeeded in having a modified form of Flemish bond worked

into the wall; not as he had intended however. He did not get a wall as it would have been had his original specification been carried out.

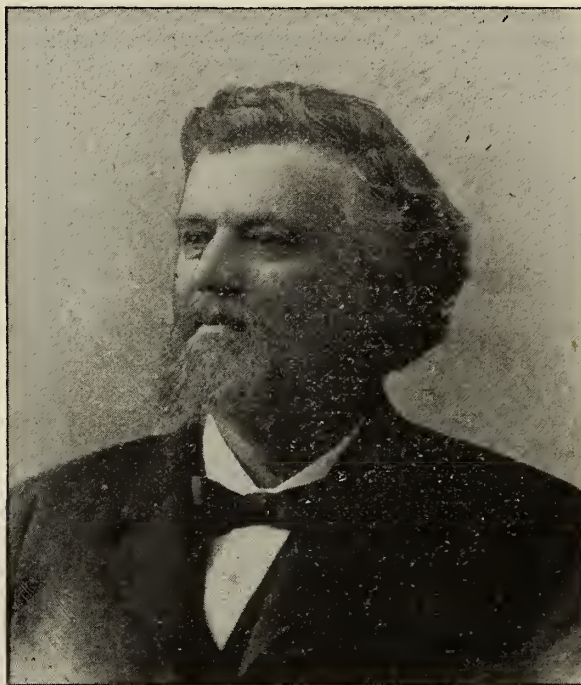
The building which is shown on the first page, has alternate header and stretcher bond. This is the almost universal way of laying brick on the other side.

A GOOD MAN AND MASTER.

JOHN MARTIN is the bricklayer of Indianapolis. It is he who has set the pace. We sent to Mr. Martin for a few facts to accompany the publication of his portrait; he did not reply in time. The date of his birth is not important. It is more important that he was born right. It is of no great moment where or when a man was born. It is of infinitely more interest to know that one comes into the world with good intentions and good ability, than it is to know a few bare facts about his history. We have said that Mr. Martin sets the pace for brick work in our city. There is no bricklayer or no handler of brick in our city who will gain say this statement. Indianapolis has long been known as a city which uses relatively a small proportion of pressed brick. The reason for this is because of the careful and skillful manner in which the common brick has been laid. It was Mr. Martin who inaugurated work of this character. The common brick work of Indianapolis is not excelled any place in the country; and as stated before, the subject of our sketch is responsible for this state of things.

Mr. Martin is an Englishman. He learned his trade in the Old Country, working there as a journeyman brick layer. The writer remembers an incident which Mr. Martin mentioned in connection with his leaving the other side of the water. It was during the early Home Rule agitation in O'Connor's time. He said that one evening after he had quit work, he walked down street and was standing on the corner talking to a friend. An officer of the law stepped up, tapped him on the shoulder and told him to move on. That part of the country was then under martial law. It was against the law to stop on the street

corner. John Martin moved on. He went home, told his mother what had happened; and added that he was going to America. Said he was going to another country where there was more liberty; where he could stop and talk to a friend on the street if he wanted to. Mr. Martin worked around Indianapolis first as a journeyman, and afterwards as a contractor, and pursued the policy with respect to his work which will make a success in any line of work. He was thorough, careful in doing whatever came to his hand. Nothing was ever slighted. If for any cause he took his contract too cheap, it made no difference whatever in its execution. All work was thoroughly and well done. The result



JOHN MARTIN, BRICK MANUFACTURER AND BUILDER, INDIANAPOLIS.

is that Mr. Martin has the preference of every important contract that is let in this section. It is now more a question with the owners, if they can get him to do the work than it is with him if he can get it to do. The result of his life is an encouragement to any one who wishes to do right. It shows that thoroughness and competence are certain to succeed. It is certainly much more satisfactory to a man and to his family to know that he has made a moderate competency through honest efforts, than it is to have accomplished much more in a material way by less laudable methods. We all know people who are engaged in various lines of business, as manufacturers, store keepers, contractors,

or otherwise, who slip through life doing work carelessly, indifferently, having in mind only the immediate result,—the dollars. Such people do not leave anything more than their money behind them. Their monument is not enduring. A man who puts up a good brick building and does the work honestly and well has done something worth while. This Mr. Martin has done and more, he has manufactured a large portion of the bricks he has laid, thus making a permanent addition to the world's capital.

A MISCONCEPTION.

A daily paper gravely announces, as though it were an important piece of news, that: "A new combination washer and nut lock for railroad use has recently proved itself very useful. The nut can be released or tightened up with the greatest ease, and the washer can be rinsed frequently."

It is, of course, of the utmost importance that the washers used with lock nuts should be arranged so that they can be rinsed frequently. The writer or "condenser" of that item knew, of course, that the duty of a washer was to wash things that needed washing (probably in this case Pullman towels and pillow-cases), and in order to do this work effectually it must, of course, be rinsed out occasionally to remove sediment and keep it in good working condition. Hereafter, we hope no inventor of a lock nut and washer will think of trying to impose upon the public with a washer which cannot be rinsed as often as necessary.—*American Machinist.*

A correspondent writes us that he invented a special tool for the use of machinists which was, as he calls it, "pirated" by a large concern; he asks us if the "pirating" was right. There are generally moral rights and legal rights in any question of this kind; and the legal rights are bound to prevail. It appears that our correspondent did not protect himself by a patent, and hence cannot legally complain; and moral complaint is simply a waste of time. It would be well, perhaps, if the world were run on the plane of morality, but it isn't so run, and about the only way to secure one's rights is by taking advantage of legal enactments.—*Er.*

Written for the Clay-Worker.

PRACTICAL POINTS ABOUT PAVING BRICK.

Fourth Paper.

BY D. W. STOOKEY.

DRYING.

THERE is probably but little that can be said of profit about drying brick intended for paving. Various methods are in use and all seem to be giving satisfactory results so far as the quality of the brick is concerned. Racks and pallets, slatted floors heated by steam, hot floors and tunnel dryers utilizing both steam and furnace heat are in use in various places. Doubtless, with other things being equal, brick which are slowly dried are stronger than those dried rapidly.

All clays shrink more or less in parting with their moisture and this shrinking, unless it takes place in all parts of the brick at once, inevitably changes the relative position of the particles and disturbs the bond by which they are held together. This is manifested in what is known as checking or cracking which injures the grain and adhesion of the clay.

Every one understands that when a brick dries, the moisture leaves the particles near the surface first and that the internal moisture only moves towards the outside of the brick in obedience to that universal tendency in nature to establish an equilibrium. The movement of the internal moisture can only be hastened in two ways. Either the outside must be dried very rapidly or the whole brick must be heated to, or near to, the boiling point of water and the moisture removed as steam. In the first case the shrinkage of the parts near the surface is of course greater than those of the interior and in consequence of this greater shrinkage the outer jacket which fit so nicely prior to shrinking becomes too small to cover the inside of the brick which has not yet parted with its moisture and still retains its original size, or nearly so. As a natural consequence the brick checks and cracks upon the outside injuring both its strength and appearance.

The oft repeated thought that clays are different, require different treatment and will act differently under similar treatment applies to drying as well as to other departments in the manufacture of clay goods. Some clays will stand exposure to wind and sun and dry rapidly without cracking to any great extent

while others are very sensitive and can only be successfully dried in well sheltered places.

The modern artificial dryers advertise to dry any clay safely in from twenty-four to seventy-two hours. The conditions under which the brick are placed in the tunnel dryers are necessarily very different from those in the yard or in open sheds and it is reasonable to expect that the clay will show very different results.

The method of drying which is best suited to any particular manufactory will depend in a great degree upon the amount of brick that are to be made within any given time. If the output is to be small and the demand for the best is limited, probably natural methods, either the yard or temporary sheds, will in the end be most satisfactory. Brick that are dried by natural means require a longer or shorter time to dry according to the condition of the atmosphere. At the very best several days are required to dry them. This requires that the capacity of the yard or shed shall be many times that of the daily output. If it takes a brick only ten days on an average to dry, and the daily production is to be say twenty-thousand; capacity of the yards or sheds should be at least two-hundred thousand; if the daily production is to be fifty-thousand the capacity of the yards and sheds should be five-hundred thousand.

This process of calculation very readily shows that natural means of drying for brick manufactories of large capacity become cumbersome and require extensive buildings and large yards with their attendant risks and inconveniences.

If the demand is large and the business justifies the expense, artificial methods may be resorted to. From the beginning these necessitate the employment of a considerable amount of capital and a constant expense for fuel and attendance.

In order that artificial dryers may be operated with the greatest possible percent. of profit they should be kept continually full of brick to be dried. As they are expected to completely dry the brick in a day or two it becomes necessary that all brick in them be changed every twenty-four to forty-eight hours. As soon as brick are dry they should be removed as nothing is gained but something lost by letting dry brick remain. As the dry brick are taken out new ones should be immediately supplied and as the most economical management re-

quires that all brick be removed as soon as dry, the demand upon the machine is made for enough brick every twenty-four or forty-eight hours to entirely fill the dryer. This, stated in another way, means that the manufactory should be run to its fullest capacity in order that the brick may be made most economically and that the capacity of the manufactory is determined by the capacity of the dryers.

These clays that were dried by natural methods with great difficulty and that required a long and guarded process in order that they might be brought safely through intact, may dry well and rapidly under the conditions that they meet in modern dryers which dry by the use of artificial heat and high temperatures. We say they may dry safely, but this is an open question which depends upon the peculiarities of the clay, the details of arrangement of the dryer and the skill and efficiency of the one who has the matter in charge.

A long series of expensive experiments have led up to the features embodied in the artificial dryers of to-day and many failures were made before the conditions necessary were discovered and fully understood, if they are fully understood which is doubtful.

It is generally known that heat is necessary to the evaporation of water. While the application of heat was probably the first step in the construction of artificial dryers the vigorous application of the heat necessary to evaporate the water contained in the brick is not all that is necessary. After the heat has been applied and the water in the brick begins to take the form of vapor the problem of removing the vapor from the dryer is met with.

In order that this may be done without reducing the temperature within the dryer too much a nicely adjusted system of ventilation must be arranged. By changing the air too rapidly much heat will be lost and the temperature within the dryer be reduced too much thus introducing the objectionable feature of an extra expenditure of fuel and labor in the effort to hold the heat to the desired point. Another objection to changing the air too rapidly is that of introducing conditions into the dryer very similar to those met in the outside air of a hot windy day.

Those sensitive clays that shrink and crack in the open air would be very likely to do the same if subjected to a current of hot air in an artificial dryer.

On the other hand if the ventilation of the dryer is not sufficiently rapid the moisture will be forced from the brick by the accumulated heat and not finding a ready exit will tend to condense upon the cooler objects within and a damp, steamy condition will exist within which not only retards drying but will be very likely to injure the brick.

Much experience and judgment, united with a thorough knowledge of the scientific principles involved are necessary in the construction and successful management of an artificial dryer for clay products. Whether or not the builders of the dryers in use have overcome the difficulties that necessarily arise or whether they are compelled to adopt an experimental process for each new clay that they are called upon to deal with is a question that does not come under the subject under consideration although it is one of interest both as an indication of the progress of the brickmakers art in the abstract and of vital importance from a financial standpoint to those who are contemplating the adoption of artificial methods for drying their brick.

Written for the Clay-Worker.

HINTS ON BRICKMAKING.

BY R. BRICK.

No. 66.

A TRAINING SCHOOL FOR CLAY-WORKERS.

THE writer and others have in the past called attention to the lamentable fact, of the great and entirely unnecessary loss of time and money sustained by men and firms who put their money into a brick plant, not being practical brickmakers themselves, and failing to secure the services of a competent and reliable man to make the plans and execute the work properly. It is not necessary to argue this proposition. Every man interested in brick manufacture, either directly or indirectly, who has visited brick plants at all, read the CLAY-WORKER, or attended the sessions of the National Brick Manufacturers' Association, knows that tens of thousands of dollars are absolutely wasted every year in our business, for lack of proper management. How may this be avoided? Wherein is the remedy? It is caused from lack of

proper knowledge of the business. Then the remedy is, education along the proper lines.

It may be said by some, there is no lack of practical brickmakers in this country. Perhaps this is true. But simply being a practical brickmaker does not fill the "long felt want" of the trade. Something more than a mere practical brickmaker is needed, to plan and construct a modern brick plant, and manage the manufacture of brick. He should not only be a practical brickmaker, he should be an educated, a well informed man in all that pertains to his trade; also a capable "business man." The coming manager must not



WM. WAPLINGTON, PHILADELPHIA, PA.

only possess these qualifications, he must have a technological education. He should be able to make a chemical analysis of the clay he is using, know of what it is composed and the relation the component parts bear to each other, and the effect burning heat will produce upon the whole composition, with regard to density, shrinkage, color, etc.

How can this ideal manager be evolved from the chaos that surrounds us. We have no well defined rules to guide us, or any established laws to keep us from errors. We ask one practical brickmaker of forty years' experience, "What machine shall I buy—soft or stiff clay,

semi-dry or dry clay?" He says: "Buy a soft mud machine, a brick made by any other process is not fit to lay in a wall." We ask another, he answers: "Use a dry clay machine, then when your brick is made, it is dry and ready to burn;" says "the soft mud bricks are not durable and will not bear the strain of a heavy building." This in the face of the monumental truth that soft mud bricks, well burned, smile down upon the dry brick man from the walls of venerable buildings in the Old World, where they have resisted the ravages of time and the elements for a decade of centuries. They forget that it is heat that makes brick durable. Without

this they return to earth again, when they come in contact with moisture or frost, regardless of the process of molding. We ask another, "How shall we dry our ware?" He replies, "Use nature's dryer, sunshine and air, it costs nothing." (The things that are given to us sometimes cost more in the end than if we had bought them in the beginning.) Another says "Use a hot floor," a third says "There is nothing like a tunnel for drying." Next we ask, "How shall we best burn our bricks?" Then the atmosphere grows torrid and exceedingly agitated, and we hear up-draft, down-draft, horizontal-draft, up and down-draft, round, square, rectangle, oval, continuous, regenerative, muffled, then, after all this, my friend from Illinois, the home of "Adlai," serenely comes on the chaotic scene with a *New Discovery*. So we are in the fog. All this teaches us a great truth. All clays are not alike. And no brickmaking appliance can be universally successful. We must secure that

best adapted to our clay, our location and our circumstances, and the conditions that confront us. We therefore need a training school for clayworkers, a school of technology applied to clayworking. A school where science and practice, theory and demonstration go hand in hand. In connection with the school of science, have a model clayworking plant, where clay can be analyzed, and then subjected to a practical test. A place where we can send our boys, who are practical clayworkers and fit them for successful managers. A place where clay can be sent, and, after a thorough test, we may know its possi-

bilities, whether it is valuable or useless, for the purposes we desire to use it. The young men, instead of reading Bro. Waplington's most excellent papers on chemistry, could hear him talk, and fire back questions at him, then they would soon learn to follow him through the mazes of chemical terms and combinations. Just here, I wish to thank Bro. Waplington for his complimentary references to the writer, also my venerable and versatile friend Crary. I return thanks for his kind words. He is brickmaker, builder, political economist and scientist. The writer's "bottomless hints" are not to be compared to the versatility of my distinguished Southern colleague. Commendatory words from such eminent sources are duly appreciated.

This training school can be established by State aid, or under the auspices of the N. B. M. A. Such a school, however, should not be confined to brickmaking. Terra cotta, encaustic and roofing tile, in fact every clay product that is in any way used for building material, might be included. There should be in the faculty of such a school, both scientific and practical men. I hope to see such a school in operation in my day. It would be a crowning glory to our National Association to establish this institution and endow it. Why can not the experiences of centuries be molded and blended with the discoveries of science, and bring forth a harmonious and useful combination, that will prove a blessing to succeeding generations of clayworkers.

Written for the Clay-Worker.

HOW TO BUILD A GOOD CISTERN.

THE homes of our people are not all within reach of the city water supply; nor are they all located near pure springs, or water courses, and in many cases, the only water supply available is to gather what falls upon the roofs in the form of rain or snow, and store it in ample cisterns or reservoirs for use as needed. Quite frequently the supply is found to be short at a time of year when rains are infrequent, and the householder is subjected to great loss and trouble in consequence.

An examination reveals a break in the cistern, through which the water has leaked away into the earth. The cement or plastering was cracked, broken, or scaled off by the pressure of the surface water in the earth outside of the cistern.

The trouble was in the faulty construction. The plan usually followed is to dig the hole or excavation in the earth the size and shape desired. An arch is turned over it with bricks, the spring of the arch resting on the clay, three feet or less below the surface. A curb is put over the top, and the inside of the excavation receives a coat of cement, plastered or troweled down on the clay walls. A cistern built in this manner is neither reliable nor durable, and is a source of much annoyance. Where the earth is solid clay, free from rock, sand, or gravel, such cisterns can be built for use of stock, or uses other than for drinking or household purposes. But in no case do we advise building them, because of their liability to be a receptacle for surface drainage.

Good cistern water is better for all cooking and domestic uses, than well, or spring water, because of its freedom from inorganic salts in solution, which leaves it in its natural state, known by the property of *softness*. It will not form incrustations or deposit of lime in boilers, pipes, kettles, etc. Soap will not curdle or be wasted in the use of soft water. Vegetables can be cooked quicker and better, while tea should always be made of soft water. There are but few house-keepers who do not know the value of an abundant supply of pure cistern water. Doctors often advise their patients to abandon the use of all hard water and use cistern water instead.

When it is recognized as being not only a convenience, but a positive necessity and luxury as well, it seems strange that the average home builder does not always include a cistern of large size and permanent construction, among the first additions to the home place.

To build a cistern that will give entire satisfaction will require more care and expense than is usually given. But the returns will justify the extra care and expense involved.

The excavation or pit should be dugged two and a half feet wider than the diameter of the cistern when finished, and one foot deeper. A good size for ordinary homes is, eight feet by fourteen feet in depth, with the floors slightly hollowed and the sides contracted or narrowed near the bottom—somewhat like a jug, or egg shaped.

After bringing the bottom or floor of the pit to the proper shape, it should be well rammed, to fill up any cavities or soft places in the earth bottom. Then spread on a heavy coat of cement mor-

tar, and continue it at a foot or two above on each side all around. When the mortar begins to set, pave the bottom with a course of bricks set on edge, well cemented between joints.

The walls of the cistern are started on this floor, beginning with a course of skewbacks to bring the bottom course level all around. On this course start your wall with sufficient space to allow an eight-inch wall of brick work all around, and far enough away from the side of the pit, to permit the brick-work to receive a good heavy coat of cement mortar on the *outside* of the wall, and connected with the floor all around at the bottom.

This outside coat of cement is of more importance than that on the inside; as its office is to keep all surface water from penetrating, and which cannot be forced off by pressure as on the inside.

As fast as the wall is carried up the space back of the brick-work should be carefully filled with damp clay, well rammed down in shallow layers. The walls are to be carried up and again drawn in at the top or narrowed gradually.

Three feet below the surface an arch is sprung over the top, and a neck or opening left to receive the curb.

The inside is then plastered with a coat of cement mortar, well troweled down. The cement should be the best quality of Portland or Rosendale mixed in the proportion of one bushel of cement, and two of clean, sharp sand, mixed dry and tempered for use as needed. When the walls are all plastered, make a wash with cement and water about the consistency of white-wash, then take a half-worn broom and brush the walls with the prepared cement wash, to smooth them down. When the wall has set, go over it again and it will close up all the holes and make it practically water-proof.

Every cistern should be provided with a filter, built in the same manner as the cistern, except as to size and thickness of side walls. It need not be over six or seven feet in depth and four feet in diameter, and distant from the cistern proper, six to eight feet. It should be lined with a four-inch brick wall, cemented in the same manner as the cistern and provided with a four or five inch sewer pipe connection leading from the bottom of the filter to the cistern. A few brick-bats or coarse gravel can be arranged around the opening to prevent

the filtering material from washing into the pipe.

Fill in the bottom with eighteen inches of coarse gravel and graded down to fine gravel on top; over this put two feet of coarse charcoal and graded to fine coal on top, and well settled and leveled down; over the top of the coal spread a couple thickness of burlap sacking, and put in close to the walls of the filter; then fill up with a foot of clean washed sand, which is the filter proper.

The top must be arranged to allow it to be examined occasionally and all silt or sediment scraped off of the top and fresh sand added; or, a layer of salmon brick can be laid on their flat side on top of or in a bed of sand. These can be taken up and renewed as they become foul. If the brick are dispensed with, the water entering from the conductor should fall on a slab of rock to prevent the sand from being stirred or washed through the coal below.

A cistern built as described will last for ages, and be a source of comfort to the householder.

The writer recalls one where he once lived in a town in Ohio, where the grading of new streets and a railroad left a lot standing high and dry and necessitated the grading down of the lot. This exposed the whole length of the cistern, which was left intact like a great jug. It was turned over on its side, rolled out into the street whole where it was broken up with a sledge hammer.

J. A. REEP.

TRADE SCHOOLS.

THE scholastic year of the Trade Schools of the Master Builders' Exchange, Philadelphia, is at an end, bringing with it the examinations that tell the story in the most practical way, whether the system is working for the future welfare of the pupil. From the accounts rendered by both principal and instructors, the most satisfactory results have been attained, as a larger percentage of the boys have graduated this year than last, and the averages are higher. Pupils to the number of sixty-

five were under examination, all the branches mentioned in the curriculum being represented save that of plastering, in which there are no pupils. The bricklaying class was also depleted. The direct cause of both being the unsettled condition of the question relative to apprentices. The two trades which present a stumbling block to the boy who wishes to provide for his future by learning some handicraft are, plastering and bricklaying.

When the School was first organized there was considerable opposition from a number of the Unions and at first



H. S. BENNETT, TREAS. THE WELLINGTON (O.) MACHINE CO.

they contended that the builders, as a body, were in league to prepare young men to gradually take the places of the union journeymen. A little better understanding of the matter removed these doubts, but existing laws of the various trade organizations prevented immediate action. In the meanwhile, the pupils who had just received their certificates of graduation, were vainly seeking situations so that they might apply the principles learned in the Trade Schools. Here they were frustrated. Several boys secured places, when their employers were notified that union journeymen would not be allowed to work in the same shop and either the former or the latter must go.

After some difficulty one or two lads were supplied with places in non-union shops.

With such experiences before them, many boys who had concluded to join the school, after consulting with the principal, became convinced that, after spending both time and money, they were in a worse position than an apprentice who served his five years at rough and tumble work in a shop.

From 32 pupils in 1891 bricklaying class dropped to 7. Several other trades also decreasing until the school was left with 65 pupils against 130 from its opening year. Over a year ago an attempt was made to adjust these difficulties, and the Journeymen Bricklayers' Association made overtures for a settlement which will finally result in giving the graduates of the trade school preference as apprentices, and reducing the time of certificate holders one year from their apprenticeship. As the Journeymen Bricklayers' Association is the strongest union in the city it is thought that its action will pave the way for a final settlement of all difficulties.

No apprehension is expressed by the managers for the school's future, as the great progress made by the majority of the boys offers every encouragement for a continuance of the classes, and preparations are being made to secure an additional building so that the scope of the schools can be enlarged.

At present they are confined to the basement of the Builders' Exchange, 18-24 South 7th Street, where the lads are instructed in the rudiments of a trade to be followed by an apprenticeship with an employer in actual work. The departments constitute the following trades: Carpentry, bricklaying, plastering, stonecutting, black-smith's work, plumbing and painting. Competent instructors and superintendent, W. A. H. Allen, together with a committee from the Exchange representing each trade, have supervision, the superintendent being executive head.

Instruction is given to each class for two hours three evenings of the week, one evening being devoted to drawing at the Franklin Institute, which is directly opposite.

It is expected that before the open-

ing of next term many of the stumbling-blocks existing with the trade organizations, will be removed. The greatest, that of the bricklaying trade, has been settled, and it is hoped that all the other unions that have heretofore been unfavorably disposed will follow suit, and in time aid rather than hinder the great work of industrial education.

A. QUAKER.

Written for the Clay-Worker.

SUCCESSFUL BRICKMAKERS AND WHY THEY ARE SO.

BY J. W. CRARY, SR.

THE old adage, "practice makes perfect," need not be told a sensible man who wants to engage in the manufacture of brick. True, this trite old saying holds good in all the pursuits of man, but in brickmaking it is very remarkably so. I will venture to make the assertion that there are not ten really successful brickmakers in the United States who are not long, well practiced men in the art. Indeed, there can be no real success in brickmaking unless intelligent art and skill is at the head of it. It by no means follows that, because a man is a perfect expert in a business that, therefore, he could succeed as a proprietor or owner of it.

A wise and shrewd business man can make a success of brickmaking, but the first thing he will do will be to secure, beyond doubt, the service of a thorough and reliable expert brickmaker.

REAL TRUE BUSINESS MEN ARE VERY SCARCE.

Self conceit and self importance kills more enterprises than ever die of a natural death. Many men of this kind are trying to make brick. They have some money or can command some. They take a notion that brickmaking is a sort of coining business. They have or can get a clay bed. This is their *Bullion*, all they need now is a *Mint*. Perhaps they get an "assayer" to examine the clay. He pronounces it first-class. All that is now needed is to put the machinery in position and go right along, coining brick. But right here the parallel stops. When the Mint turns out a dollar from the machine, the dollar is finished; it don't have to be dried, set and burned; it is a good legal tender, current dollar, and the process of making is a mere mechanical

operation. The assaying, the smelting, the alloy, and the coining are things of a merely routine character; they can go on indefinitely without any change of treatment in the raw material.

Not so with clay. There are scarcely any two clay-beds just alike, and the dissimilarity requires different treatment. A man may become a perfect expert in manipulating one particular kind of clay, then take hold of another kind, seemingly analogous, and he will likely fail, at least in his first effort to make brick.

THE AMATEUR BRICKMAKER IS FIRST IN LOVE WITH MACHINES.

He sees a fortune in a brick machine, a dryer, and a patent kiln; he has a clay-bed, and sends a sample to the patentees of the machine, dryers and kiln that he has taken a fancy to. Of course, they can or will supply him with just the things he needs to succeed, and he is soon perfectly stocked with an outfit of all he thinks is necessary to complete success. As to an expert brick setter and burner, that has been a secondary consideration, and our new fledged brickmaker picks up the first fellow that comes around and says he can fill the bill to a fraction, but he has never burned brick of the same kind of clay now to be used, nor does he know anything about the theory and science of manipulating the different kind of clays, nor is he questioned in this matter. His employer only wants to know that he has, at some time and place, set and burned brick. Our new brickmaker has been at some brickmaking works; he saw, perhaps, a black or white man of very common appearance, in charge of a burning kiln, and he is not looking for a man of any polish and intelligence to burn brick, so he employs his said to be expert setter and burner, and pays him about twice more than he pays a common laborer.

OF COURSE, THE RESULT IS A FAILURE.

For no man, who is really competent to take full charge of setting and burning brick, at all times and places, would think of less pay than from two to three thousand dollars a year, clear of all proper current expenses. But our amateur brickmaker could not think of such a luxury as a thorough based, intelligent, brickmaker to direct his new plant. He has been told that a good clay-bed, a good brick machine and dryer, is the right end to begin at to make a fortune. A whole year is spent

in successive failures to set and burn brick, and the loss is, perhaps, five times more than a reliable, well accomplished brick setter and burner would cost.

Now, suppose that our new brickmaker had said to the brick machine man, "Come and look at my clay-bed, and decide for yourself as to the fitness of my clay for your machine, then select a kiln and a dryer that will just suit the clay, then put up the machine, the kiln and the dryer, and furnish a thorough expert to manage and run the whole plant successfully for one year. I will advance one-half cash for the whole thing, and the balance at the end of the year, provided that first-class brick be uniformly made and burned, and all your patent improvements are well tested and left to me in successful operation."

NOW YOU SEE, THERE IS BUSINESS IN THIS.

There are plenty of brick machine men who would be glad to accept this kind of a proposition. They would take no risk. If the clay did not suit one class of machines, dryers and kilns it would another, and the party who would undertake to put in a *plant* would be sure to select the best improvements and skill for the purpose.

If this plan for establishing brick works were followed by those who desire to engage in the business of making brick, there would soon be a class of contractors and experts in setting and burning, that would promptly supply all demands, and the ruinous spectacle of *tentative* brickmaking would disappear.

I am frequently receiving letters from parties who have started to make brick just as I have above described. They want to know how to get rid of certain difficulties in their way; some refers to the clay; some to the dryers; some to the kilns, but more than all others, to the trouble in setting and burning. It requires as much brain, and more muscle to make a first-class brickmaker, as it does for any of the so-called professions, and, until the art of brickmaking is learned and practiced, appreciated and paid for, as any other profession, there will be bad luck, bad brick and failures all along the line of new-fledged brickmakers.

The idea of spending large sums of money to put in operation a brick plant, with no proper or adequate skill and intelligence in the art, is an absurdity, scarcely to be understood.

WILL IT PAY TO RETAIN A FIRST-CLASS EXPERT BRICKMAKER?

Should be the first thing to consider by those who wish to manufacture brick and have no proper skill in the business. To answer this question intelligently, we will suppose that a *plant* is started to make 3,000,000 brick per year. Now, the difference between ordinary management, especially in setting and burning, and the best possible management is, at least, one dollar per thousand brick. So we will say, cost of ordinary management, \$1,200 per year; loss in quality of brick, \$3,000, equal to \$4,200, cost for management. Now, a professional expert, who would be willing to insure first-class work, would cost \$2,500, and free boarding. This leaves, at least, \$1,500 clear gain in the price of brick, besides a valuable, though not specific gain in reputation as a manufacturer.

Written for the Clay-Worker

SALT GLAZING.

HOW IS IT DONE AND WHAT ARE THE BENEFITS?

IF I was able to state the exact temperature of furnace fire and kiln necessary to produce a proper salt-glaze would the average brick and tile-maker be able to judge when his kiln had arrived at this temperature? I think not.

I fancy just here many of your readers will give the temperature required in some such terms as the following: "White heat," "bright red," "sparkling white," or "just before you stop firing," "after you have settled the kiln," etc.

No doubt many if not all of these answers are correct, but what is "bright red," "white heat," etc. No doubt most of us have often heard burners arguing as to the heat that was in a burning kiln, one claiming one degree and another another, neither having any means whatever of measuring the temperature. We are told, however, by "Box on Heat," Second Edition, page 39, that the temperature corresponding to the various degrees of color are as follows.

Red, just visible	977° F.
Red, dull	1290° F.
Red, cherry dull	1470° F.
Red, cherry full	1650° F.
Red, cherry clear	1830° F.
Orange deep	2010° F.
Orange, clear	2190° F.
White heat	2370° F.
White, bright	2550° F.
White, dazzling	2730° F.

But there are very few who can accurately distinguish the various shades of color in a burning kiln; hence it is not so very important to know the exact temperature to which the brick or tile must be raised to receive the glaze properly. But it is necessary for the burner to know by comparison just how the kiln should appear, to his eye, to be in the proper condition to apply the salt.

He should also know by careful experiment with his fuel and furnace the best condition of the fires at which to apply the salt.

I do not think any iron clad rule can be made to apply, though there are a few general principles that can be properly observed.

There are a great variety of glaze mixtures designed to be applied to different kinds of clay wares. Clay wares in this respect may be divided into two general classes, the one being composed of materials which fuse at a low temperature, the other of materials which require a very high temperature, but produce a dense, non-porous body. Clays composing this latter class are the most suitable for salt-glazing.

It must be remembered, however, that all glaze must be composed of materials which form the glaze at a somewhat lower temperature than the fusing or melting point of the clay.

Clays that fuse at a very low temperature are usually put through two firings that is burned twice in order to glaze which makes them undesirable for brick or tile glazing, while those that require a very high degree of heat can be readily glazed with one firing; hence clays that require a high temperature to produce vitrification are suitable for salt-glazing when made into the courser wares, such as brick, sewer pipe or drain tile.

It is hardly profitable to discuss the various glazes as that know as the "salt-glaze" seems to be the only practicable one for the brick or drain tilemaker.

I think the most common method of applying the salt is to burn the kiln almost, if not quite, to a finish, get the fires to a very high degree of heat (and if you desire a clear, transparent glaze) allow all the volatile matter or gas and smoke to burn off, then moisten the salt and throw it over the incandescent fuel on the grate bars.

I am not able to say just how much of the salt should be used, this can only be learned by experimenting with your fuel and kilns and clay; I think, how-

ever, the average is about one-half barrel or less of salt to an average sized kiln of drain tile, say a kiln 20 feet in diameter. The salt should not all be applied at one time of firing.

It is usually best to add the salt during the last two or three rounds of firing.

Some times the salt is applied directly to the wares through apertures in the crown of the kiln. I do not think this the better way. The salt being dampened is readily decomposed by the heat forming hydrochloric acid and soda which uniting with the siliceous materials of the brick or tile form thin coatings of real glass or glaze over the surface of the ware.

It must be remembered that this glaze does not penetrate the body of the ware; also, that in order to take a good salt-glaze the clay from which the brick or tile are made should contain quite a per cent. of siliceous matter.

Now as to the latter part of the question: "What are the benefits of salt-glazing?"

After listening to a great many discussions of this question in various clay-workers conventions I have come to the conclusion that the benefits should properly be divided into two classes, real and imaginary.

The real benefits apply more particularly to the manufacturer while the imaginary benefits are almost wholly with the consumer.

The drain tilemaker knows the force of this statement. In the case of sewer pipe there are some exceptions. The custom of salt-glazing sewer pipe has become so universal that it is now taken as a matter of course, and a sewer pipe might almost as well be without the opening through the center as to be without glaze.

But as to drain tile I must confess I fail to see any real practical use of the glaze, but the manufacturer claims that he can find a more ready sale for glazed tile than he can for the unglazed.

If this is so, glaze them and participate in the real benefits; undoubtedly glazing if properly done gives the body of the tile a better appearance and with a little skill the color of the tile can be very much changed, that is, the entire kiln can be made to have a much darker and more uniform appearance besides some of the small cracks can be hidden, especially if the fires are manipulated so as to discolor the glaze. This can often be done by putting the salt in before all

the volatile matter or black smoke has burned off.

Some kinds of green wood will discolor the glaze.

We now hear some brick manufacturers advocating salt-glazing especially street paving brick. "Why?" For the reason stated above, if the glaze is discolored it gives the brick a darker shade having the appearance of being burned harder and more uniform besides covering up many small cracks and imperfections in the surface. The glaze being a very thin glassy veneering on the surface of the brick can not certainly add anything to its wearing qualities, still it does not do any harm to the brick and if glazing pleases the buyer, why glaze. We all take more or less to "white washing" for which glazing is but another name when applied to street brick.

W. A. EUDALY.

Written for the Clay-Worker.

CONTINUOUS KILNS.

First Paper.

ABOUT a century ago a very intelligent Frenchman, a brickmaker in the neighborhood of Paris, conceived the first idea about continuous kilns for burning brick and other goods made of clay. When I was studying architecture in Berlin, Germany, I discovered in the library a very old volume about brickmaking, which described the invention of that Frenchman. He built a long tunnel with a certain number of iron wagons (cars) in it, the platforms of the wagons extending on both sides over the wheels and axles, and an offset constructed on the inner side of the outer walls about one foot below the skewback of the arch. The platforms of the cars joining each other at the ends, and were covered with fire brick laid in fire clay. One side of the tunnel contained six or more furnaces of same height with the top of platforms in distances from center to center equal to the length of cars. Each end of the tunnel was to be closed by means of sliding iron doors, and a tall chimney was built over one end of the tunnel. The green brick were to be loaded on the cars, in the center of each car an arch is left to correspond with the furnaces in one side of the tunnel. At certain intervals a car, loaded with a small amount of brick, would be pushed into the tunnel from the end where the chimney was located, and as soon as the first furnace was reached by the first

car, firing commenced till the whole tunnel was filled. The door opposite the chimney-end contained some openings with dampers, so as to allow and regulate the going in of necessary fresh air for cooling the brick and for combustion. As often as a new car with green brick would be pushed in at the chimney-end, one car with burnt brick would be taken out at the other end. Those cars or wagons could be loaded on the yard or any place where green brick were made and dried, and the burnt ware hauled in the same wagon to the place where the brick were to be used or loaded for shipping. It is evident that it was the purpose of the inventor to save handling of the brick, to use the heat of the cooling brick to heat up the air for combustion, and the surplus heat of the fire to heat up the green brick, and water-smoke the same. It was a grand idea, but after several very expensive experiments it proved to be impracticable and was dismissed. In another place in this article, describing a recent renewal of this invention, I will explain the disadvantages of the same.

Forty or forty-five years ago Mr. Friedrich Hoffman, a Prussian Government building-master at that time, invented the first form of the modern continuous kiln, which, after undergoing considerable improvements and changes, is about the only kiln used at present on European and Australian brickyards, which have to stand competition and want to produce good material in an exceedingly economical way. In view of these facts and experiences in the so-called "old country," it seems to be incomprehensible that the continuous kiln is so very little known in the flourishing country of the United States, and is used only in a very few cases. I will try to account in the following lines for the lack of confidence in the continuous kiln in our American country, and at the same time explain the construction and working of the modern continuous kilns, starting with the description of the first Hoffman kilns:

All continuous kilns, with a single exception, which will be mentioned later, are varieties of the Hoffman kiln. The first one he ever built was erected near the city of Stettin, Pommerania, for a wholesale dealer in building materials, Mr. Johannes Anistorp, and proved to be an entire success. In 1885 I received a letter from Mr. Anistorp in which he

said, that his first kiln was in operation yet, without any material changes. Being well acquainted with Hoffman and Anistorp, I know that the latter built about four or five kilns of similar construction, one of them, which I especially watched during construction and running for the first three years, was a double kiln, having a daily capacity of 72,000 large sized brick. Anistorp uses the same kind of kilns for burning Portland cement.

The first Hoffman kiln consists of a tall, round smoke-stack, containing air spaces in the walls, located in the center of the whole building. A small tunnel surrounds the stack, which is called the "Rauch-Kammer" or smoke-chamber. A second endless tunnel, which is the kiln proper, surrounds the smoke-chamber tunnel. The smoke-chamber is connected with the stack through two openings, which cannot be closed, and the kiln proper is divided into 12 to 16 compartments by means of 4-inch by 18-inch projecting shoulders, following the sides and arch of the kiln. Each compartment has a down draft flue, leading over and partly in the floor of the kiln, next to the projecting shoulder through the inside wall downwards underneath the bottom of the smoke-chamber, then turning upwards and provided with a very ingeniously constructed damper, which can be easily handled by means of iron rods extending through the top of the kiln. A series of holes are built in the arch of the kiln, arranged in rows across the chambers and provided with small iron pipes covered with caps bedded in sand. These are the feed-holes through which the fuel is dropped into chimney-like openings, set in the green brick, put in for burning. Each compartment has a door opening close to the projecting shoulder as in entrance from the outside of the building.

I am dwelling at considerable length upon the description of this kiln, hoping not to fatigue the readers, because it is necessary to have a full understanding of the first construction and principle of this kiln, so as to make the following clear and comprehensive and to enable the intelligent reader to judge for himself of the merits of the continuous kilns in general and of the certain varieties in particular.

Inspecting the first Hoffman kiln, which is built with 14 compartments and which I believe, holds 12,000 brick for burning in each compartment, we find

that one compartment is always kept empty. We will suppose No. 1 should be empty at present. In that case burnt brick from No. 2 will be taken out, and a sheet-iron partition will be observed pressed against the projecting shoulder on the end of No. 13, handles of the partition were sticking out through the door of 14; green brick are setting into 14. At the conclusion of the days work another iron partition (consisting of three parts, joining each other with tongues and grooves like flooring), will be fastened at the end of 14, and after this is done the sheet-iron partition from 13 will be pulled out through the door of 14, and the latter sealed air tight. All other doors are sealed also. As soon as this changing of partitions is completed, the fireman on top of the kiln opens the down draft flue of 14, and closes the same of 13,—all other dampers continue to be closed. The fireman drops a small amount of fuel, at certain intervals, through the fire-holes on top of the compartments 6, 7 and 8, each compartment containing 4 rows of fire-holes. Every six hours he stops firing one row of 6 and takes one row of 9 into fire, thus advancing, during twenty-four hours, one whole compartment and dropping one in the same space of time. The cold air for cooling the brick and for combustion, enters the kiln through the open door of 14, 1 and 2, rushes through the cold burnt brick of 2 and cooling warm brick in 3, going through red hot and white hot brick in 4, 5 and part of 6, enters the fire in a superheated state, and leaves the fire in the first part of 9, heating the brick in front of 9 up to a red hot state without any extra fuel, and partly heating up and thoroughly water-smoking the brick in 10, 11, 12 and 13; passes through the chimney into the open air.

It will be seen, that Hoffman solved, in a very thorough manner, the problem which the first mentioned French inventor tried to do, namely:—The problem of using the heat of cooling brick by feeding the fire with superheated air, and of using the escaping heat from the fire for water-smoking and heating of the green brick, so that only a small amount of fuel is needed to give the brick a finishing touch; and, at the same time, giving ample space of time for gradual water-smoking and cooling.

Hoffman's first kilns, as described above, consisted of a series of walls, sur-

rounding the central located stack like rings, from which construction, the general name of all continuous kilns became "Ringovens."

[TO BE CONTINUED.]

Written for the Clay-Worker.

THE TRIALS OF A BRICKMAKER.

No. 2.

BEING INITIATED IN THE BUSINESS.

THE conclusion of a matter often turns out different from its conception, and this fact applies to brickmaking in about the same manner as it once did to the Irishman who attempted to hatch out a pumpkin. It is told of the latter that shortly after landing in this country and when taking a stroll through a farming section, that he came across a Yankee farmer who was driving along with a load of the big yellow fruit. "Ah," says Pat, "and phat have yez there?" "Go along be-gosh," replies the Yankee, "and what is it of your business?" "Well," says Pat, "I ain jist over from the ould countree and beggin yez pardon I would like to ax if them would be apples." "Naw, them aint apples," says Jonathan; "them is eggs." "And bedad," replies Pat; "phat kind of illegant eggs is they oneway?" "The kind" says Jonathan (pointing to a span of mules hitched to the wagon), from which such horses are hatched." "Begorra" says Pat, "and phat does yez ask for such an egg?" After a little bantering the Yankee made Pat a sale of a pumpkin for five dollars, and instructed him to go home and sit upon the same for two weeks, when he was assured there would come out a "long-eared horse."

Carefully Pat carried home this pumpkin egg, and taking it to bed with him he sat upon it for two weeks, but without any apparent effect. Finally he became convinced that he had been cheated by the Yankee, and taking the pumpkin he started out in the country to find Jonathan and make him give back his five dollars. Now, it happened that at a certain part of the road was a hill; at the foot of the hill was a large oak tree, and behind the tree lie sleeping a long eared Jack rabbit. Just as Pat started down the hill he fell, and the pumpkin escaping away from him started off with a great bound, and headed direct for the oak tree. The breaking of the pumpkin against the tree frightened the rabbit, who scudded away for dear life, while poor Pat sang

out at the top of his voice: *Arrah wid ye, cum home to yez fuather! Cum home to yez fuather!*

Many a man has found out after a long time sitting upon a business egg, that the only long eared Jackass hatched out was the one which all the time had been setting upon the outside of the pumpkin.

Sitting by appointment in one of the booming real estate offices of a booming Missouri City, a few years ago could have been seen five booming young men. All had made some little money—selling Missouri mud as city's foundation, and all were now anxious to try to add to their pile by making brick wherewith to build thereon. Front brick at the time, and in that city, were selling for twenty dollars per M, and common building ones for nine dollars per M. According to the guaranteed increase of the dollars invested, (as per the machine man's calculation), and the plain chart by which they were to safely sail and land their brick making ship, (as per their own calculation), it is easy to realize that it did not take them long before their names were pledged to take up their proportion of the capital stock after they should have paid their money in the treasury.

If a man is lost in the forest and does not know it, he travels along with just as merry a whistle as if about to come into camp with a full basket of trout. The tune of the fisherman changes only after he realizes that he does not know which way camp is, and the brickmaker's whistle becomes a sigh about the time when he realizes how deep is the well from which he is to draw his knowledge of the business, and how short the rope with which he has to reach it.

The booming brickyard was rushed with characteristic western energy. Two dry presses were purchased and a tracer started after each, in order that no delay might occur on the railroad. Good sense was shown in the selection of one machine for it was at least a new one. It is human to err, and in purchasing the second machine our boomers committed one of their most serious errors, for they thought they were making money in buying a second hand machine cheap. Sometimes it comes very easy to give advice and just here we wish to try our hand at it. If you are determined to get rich at brickmaking let us beg of you do not trust to the machine which some other fellow has busted up over in trying to operate.

For every dollar you will save in the first cost, you will eventually lose a hundred. St. James says in the Good Book that, "if ye resist the devil he will flee from you," and this is one of the devils the brickmaker wants to resist with all his might and main. We know whereof we speak because we have been there. The booming brickmakers found out how true this was after a little course of experience.

What a grand schoolmaster experience is, and how mighty expensive. Oh that a business man's hindsight came first! In the light of it how soon he would lose his own good opinion of his foresight. The new machine of the boomers made its 20 M brick every day, and the second hand one;—well, as a brickmaker, it was a trial failure, but, as a monument, it was and still is a success, but the remainder of its history comes a little later. As we said before, the new machine made brick if the other would not, or rather we will state that it made a perfect brick as an unburned one. A mechanical success had been realized and each stockholder put another lock on the vault where he kept his securities.

The full grown, perfect brick burner is a "Will 'O the Wisp," and like the Paddy's flea; when you put your fingers on him he is not there, but only to be found in your neighbors yard. Our boomers soon found this to be a sad but true fact. Not knowing how to burn brick themselves they could only trust some one to do so who said he did. Perhaps he did understand how a stick of fuel would operate on a dried piece of mud called a brick, for that is the way he had always burned them; but when it came to shoveling fuel under squares of compressed clay which were bound to go back to their original form, he was nowhere, and no wonder. We have learned to have great respect for the brick burner who acknowledges that he has not learned it all. That man, we are willing shall gain some experience at our expense, for we have faith in the fact that our loss shall be his gain. If a burner has reached such a perfection of knowledge in his trade that he can learn no more, he had best retire on a pension, and the funds thereof be supplied by men who are starting in the business. Such men, while pretending to be guides are really fishermen lost in the woods.

There is one thing about brickmaking that does not grow stale, and that is the

opening of each kiln of brick. From the first one made in the season to the last, there is an uncertainty of the result of the burn, which lends excitement to reputation, and the burner himself is generally more sure of good results when he is about to close a kiln than when about to open it. When the boomers closed their first kiln of 300 M, the manager was assured that he would have a remarkable lot of brick, and he did, for they were exactly like the Deacon's One Horse Shay, which upon going to pieces was utterly annihilated. Water-smoking too fast had "honeysuckled" them like ice under a July sun. They were piled up on a back lot, and have long since melted and run into the river.

Why go ahead with the history? There was always an excuse for the past failure, and a reason for the hope of future success. One kiln had to be shoveled out and the next had to be blasted out. A third would be good enough to revive confidence in the man and the business, and bring up the courage of the directors to borrowing a little more money. Is the reader surprised that the boomers put up with such a series of failures? If so, I would ask them if they had forgotten their own initiation in the business. The man had a first-class recommendation and not one of the company was competent to judge whether he was a good burner or not. Perhaps you ask whether they ever did become competent to judge. Well perhaps so, but not upon that yard. Oh no; that yard has long since been a thing of the past, and has "gone where the woodbine twineth." One day, about a year after the yard was started, the burner thought he would, at least, get one kiln hot enough, and he did. He actually succeeded in raising the heat out through the top of the kiln and into the roof of the shed. After the fire was put out the brick were still left *unburned*, but that was all. No; we will not say all, for there was something else and it is there yet after many a year.

Many and many a traveler on a moonlight night has looked from his car window over the Kansas prairie and seen suddenly loom up before him, a great black object, which he thinks must be the Banshee of some old Indian tribe. Perhaps his fellow traveler is asleep and as he does not care to disturb his slumbers by inquiring as to what can be that strangely misshapen animal, he allows

his thoughts to wander back over the countless ages since the prairie was formed. He pictured to himself the Indian maiden and her lover; the Indian warrior and his battle, and falling asleep dreams that the great black object, which he saw sitting upon the prairie, was the monument erected by the great spirit to commemorate the valor of departed red men. Alas, it was a monument, but one serving a more ignoble purpose; a monument around which had once clustered many bright hopes and expectations, but which were now forever buried in the hearts of their owners. To thousands it is an enigma, but there are at least five mortals who could give you its history, and if they cared to do so, they would tell you that it was only an old second-hand brick machine, but that it stood recording the rise, initiation and downfall of five booming brickmakers.

J. A. S.

Written for the Clay-Worker.

BRICK AND WOOD.

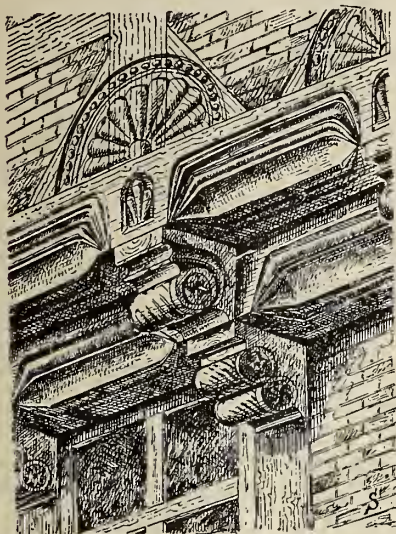
OURS is the land of frame houses. In no other country are they so universal. In European countries very little is known of them.

In passing from one part of our country to another, and in seeing the vast proportion of frame buildings and the large proportion of wood which is used in all buildings, we may well understand that in time our forests will have been destroyed and we will have to build more economically with respect to the use of wood. Speed the day when wood shall be less universally used. The timber is getting scarcer all the time and in the course of years other constructive methods will have to be adopted. This is not a fact to be mourned. We have now a fire tax which is larger and more pressing than other tax with which this nation is oppressed, and it is largely the outgrowth of our building methods which have so largely to do with the use of wood.

There are other countries where wood is high and which are now in the condition that we will be in the course of years with respect to the use of wood as a building material. "What do they use?" may be asked.

In some sections of the world the floors are formed, by turning arches from wall to wall or from pier to pier. In other sections timber is used to a limited extent, and filled in be-

tween with concrete brick, or other substantial material. In the French cities iron is very largely used. In Paris its use is almost universal. In many of the towns and smaller cities wood is used sparingly and with high regard for its protection from fire. In other sections of the world we do not find the large number of detached



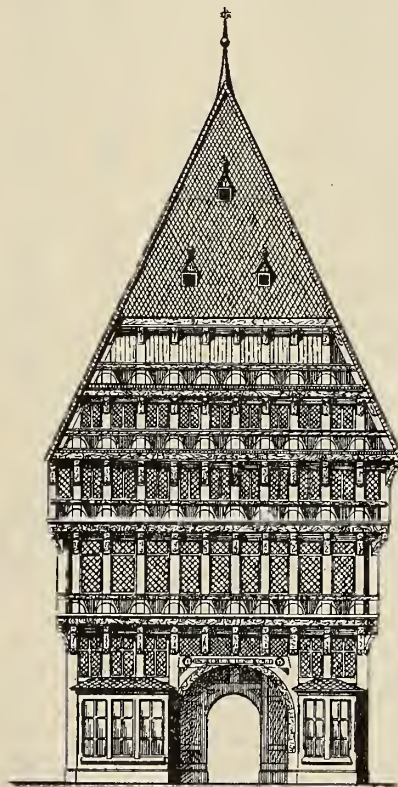
houses which is common with us, which may well be considered as a distinct problem which in time must be solved by us.

In the illustrations which are given herewith, there are details and elevation of German half timber work. While these buildings are not detached, while they are built close together and on streets the same as our stores, yet it is well to understand that certain principles of their construction, and the details of their finish are easily adapted to forms and methods suitable in the erection of detached houses. By detached houses is meant those which are located on lots with yard space all around them. For instance, in our own city a large proportion of building lots are forty feet front. The house is set well to the north or west line, according to its frontage, and there is space all around it. With the German half timber construction, about one-fourth of the amount of timber would be required to build a house, that is now employed. The framing timber is filled in between with brick or concrete, according as local conditions make one material or another cheaper or more desirable to use.

We cannot expect to find our problems worked out in detail for us by those who have been before us. The

designs which we show are in their planning, and general arrangement suited to the conditions of German living in the northern and middle provinces of that country. Our ideas of living and the conditions which surround us, call for different planning and different arrangements. However, there are details of constructive forms which we may use as a part design and draw therefrom with a view of deriving a certain amount of benefit. No one can say anything against the constructive details or the constructive forms of this German half timber architecture. It has stood the test of time and presents good experience for fire insurance.

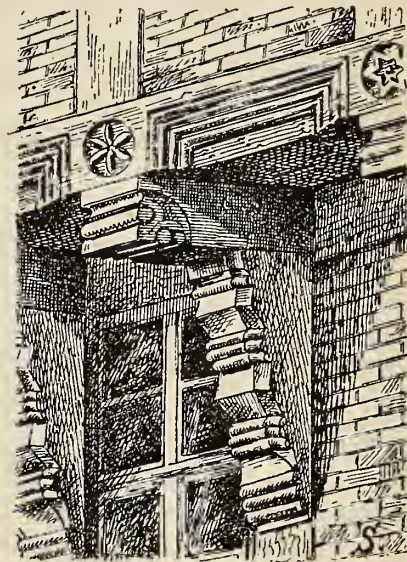
The examples which we show are those of the 17th century, or some earlier. Certainly the details of construction are superior to that which is common in our wood construction, and in time we will come to something of this kind.



Not that we will have exactly this sort of thing, but will draw our designs from it; we will have the framing timber solid and the large spaces between filled in with brick or other material of like character, and in the end an altogether better building, more picturesque, more interesting, and of a quality better calculated to protect it from the elements. Our cheap wooden buildings are in themselves a tax. They are necessarily temporary, and in the course of years

must be taken down. Say one builds a frame house and pays \$5,000 for it; that house in all probability, will not last more than forty or fifty years, and in the meantime it is probable that more than twenty-five per cent. of its cost will have been added to it in the way of repairs. In this we will say that there is an absolute waste of capital. That, during that time, something over \$6,000 has absolutely been thrown away

It is a disposition of our people to feel that in building they are only building for their own time, or temporarily; that forty or fifty years is long enough. This sort of



building is not that which adds permanent wealth to a country. If the large proportion of money which is being expended in building to-day is gone at the end of forty or fifty years that amount of capital has absolutely been thrown to the wind. If a \$5,000 house could be built in a permanent way, or if the accommodations of such a house should be carried out at even a higher cost, with the knowledge that at the end of forty or fifty years that building would be substantial and in good character, it is easy enough to see that that structure is a permanent investment, and represents permanent capital. We see this in the buildings of the old world. There they build a house for posterity, and it is permanent wealth to the descendants through generations.

We have not yet passed the pioneer stage in most of our building ideas. These cheap frame structures which are so largely in the majority, both as to cost as well as number, are conceived in a pioneer spirit. To be sure the

pioneer put up a mere shed or shanty and our frame buildings are not exactly of that character. However, they embrace the pioneer idea in their temporary character. No one who builds a structure of this kind has in mind that he is building up wealth for his family. He is doing the other thing. He is leaving an unhappy heritage for them. Something which they will have to destroy, rebuild, or work over.

While we cannot in our present condition be expected to build in the splendid way, which is common to the German and French cities, we may go a little in advance and take up with the half timber idea, which is so much better than most of our building work as it is now carried on.

Written for the Clay-Worker.

CHEMISTRY FOR CLAYWORKERS.

Paper No. 4.

REMEMBERING that I promised you a table of the other elements, and, knowing it is high time you had it, to be anything like systematical, therefore, here it is. I have, however, just bethought me, it would be better to divide the remainder of the elements into two classes; the first will contain the metals that are well known, at least the bulk of them, and the second table will contain the rarer metals, some of them little more than chemical curiosities yet. I must impress on you the necessity of committing the first table to memory, the other you may look over occasionally.

These twenty-four are, with a few exceptions, common every-day articles of commerce, but some of them are very difficult to reduce to the metallic state; calcium, for instance, has only been seen by very few, it is very difficult to reduce and very difficult to keep when it is reduced; by reducing, I mean, changing to the metallic state, or using the term in a broader sense it means changing to the elementary state, it then includes the metallic and non-metallic elements too. The rarer metals are:

Name.	Symbol.	Atomic Weights.
Caesium	Cs	133
Cerium	Ce	92
Columbium, or Tantalum	Ta	182
Didymium	D	96
Erbium	E	112
Glucinum	G	9.5
Iridium	Ir	197
Lanthanium	La	92
Lithum	Li	7
Molybdenum	Mo	96
Niobium	Nb	94
Osmium	Os	199
Palladium	Pd	106.5
Rhodium	Ro	104
Rubidium	Rb	85
Ruthenium	Ru	104
Tellurium	Te	129
Terbium (doubtful)		
Thorium	Th	238
Titanium	Ti	50
Tungsten, or Wolfram	W	184
Uranium	U	120
Vanadium	V	51.25
Yttrium	Y	62
Zirconium	Zr	89.5
Norium (doubtful)		
Pelopium (")		
Thallium (")		

Name.	Latin.	Symbols.	Atomic Weights.	Specific Gravity.
Potassium	<i>Kalium</i>	K	39	0.865
Sodium	<i>Natrium</i>	Na	23	0.972
Barium		Ba	137	
Strontium		Sr	87.5	
Calcium		Ca	40.0	
Magnesium		Mg	24.5	1.70
Iron	<i>Ferrum</i>	Fe	56	7.079
Chromium		Cr	52.5	5.9
Manganese		Mn	55	6.85
Zinc		Zn	65	7.1 to 7.86
Aluminum		Al	27.5	2.60
Nickel		Ni	59	8.80
Cobalt		Co	59	8.54
Tin	<i>Stannum</i>	Sn	118	7.29
Antimony	<i>Stibium</i>	Sb	122	6.70
Arsenic		As	75	5.88
Bismuth		Bi	210	9.82
Cadmium		Cd	112	8.7
Copper	<i>Cuprum</i>	Cu	63.5	8.96
Gold	<i>Aurum</i>	Au	197	19.5
Platinum		Pt	197	21.5
Lead	<i>Plumbum</i>	Pb	207	11.45
Mercury	<i>Hydrargyrum</i>	Hg	200	13.59
Silver	<i>Argentum</i>	Ag	108	10.47

This now completes the list of recognized elements, from which every known compound is derived; which signifies that every form of matter effecting the senses, is either one of the elements, or derived from two or more of them directly or indirectly. You will observe that all the rarer metals end in *um*, in fact all the metals would end in *um* if their Latin appellations were used.

From the beginning of the present century chemists have endeavored to systemize chemical nomenclature, but a perfect system must not be expected, because only a perfect knowledge of chemistry could secure such a system. The aim constantly kept in view is to apply to matter, names, prefixes, and suffixes that convey definite and unmistakable meanings as to quality and atomic quantity of the substance under notice.

For instance, sulphate of magnesia, which I told you in my last letter was the well known purgative medicine called "Epsom Salts." Now this common name conveys no idea of the composition of this salt, neither does the well-known horse medicine called "Glauber's Salts," which is the sulphate soda, nor does the well-known substance called "Saltpetre," this is nitrate of potash; that which you call "smelling salts" and marked on the bottle in the drug store "*Sal. Vol.*"—this is a contraction of "*sal volatile*"—or in clumsy English, volatile salt. The up-to-date drug store bottle is marked "Amm. Carb.," which is a contraction of "Ammonia Carbonate," the not-quite-up-to-date chemist calls it "Carbonate of Ammonia"—this is the name I wish you to know it by for the present. Chemistry,—like brickmaking—is forging ahead with improvements every day, and chemists are as much beset with the sin of prejudice as clayworkers, and it is very provoking to find, after you have nicely mastered one system, there is an improved system floated and you are going to be left behind if you do not fall in line and keep in the ranks. When I look down deep into myself, I find there is a great similarity between my nature and bias and that of a great number of clayworkers, we reject improvements until we are *compelled* to adopt them, and often back our prejudices up with heavy buttresses of sophistry and think we are quite safe behind them. Weak, and silly delusion; our compeers are quietly enjoying the laugh on us, but I am again straying from my subject, and, while I think of it, let me

tell you the difference between Sal Volatile and Smelling Salts, the first is a solution of the second, or, the second dissolved in water will produce the first. I give you this information to prevent disappointment and mistrust when you see the druggist pouring a *liquid* from a bottle, when you have been taught that the substance bearing that name is a *white powder*.

I want to call your attention to a few more common everyday articles or substances, as I think this will increase your interest in the science of chemistry, but I have a further object in view which I will make known to you by and by. Common table salt is the chloride of sodium, and Sal-Ammoniac, another very common substance is, the chloride of ammonium. Red lead, is an oxide of lead and white lead, is a carbonate of lead.

Now we will tabulate these few common substances with which you are all more or less familiar, as they are often called into requisition in the ordinary domestic and industrial processes, and tabulating will enable you to comprehend better the system of nomenclature I am bringing before you. It may afford you unbounded satisfaction (?) Sometimes when you get a prescription filled;—15 grs. Chl. Sod. and 4 oz. Aq. pura, and for which Mr. Druggist charges you 50 cents.—I say it may be comforting to know how steeply you were charged for table salt and water, but it is not my object here to put you on your guard against such exorbitancy, I want to show you the basis on which chemical nomenclature is built. Well then,

to prevent dry-rot in wood. Again, Fluoride of calcium, that pretty substance usually found in lead mines, called Fluor-spar and from which such beautiful ornaments are cut to adorn our mantel shelves; it is also the source of Fluorine; the symbol for Fluoride of Calcium is CaF_2 , so we have Fluorides, Bromides, Iodides, Chlorides, Phosphides, Sulphides, Carbides, etc. of the metals. Sometimes the non-metallic combine with each other, in which case the terminal *ide* is still used, as, bi-sulphide of carbon, CS_2 , Carbonic oxide, or oxide of carbon, CO ; tri-oxide of sulphur, SO_3 ; protoxide of nitrogen, or nitrous oxide N_2O ; the common name for this is, "laughing gas," which I have told you before; this is the gas administered by dentists previous to the extraction of teeth by them. I think you will clearly understand by this time that the *ides* are generally combinations of a non-metallic and metallic elements, but as I shown you above, both elements may be non-metallic and still produce an *ide*. Now, before I place before you the system of the *ates*, I think it will be necessary to say something of the acids first giving you a list of the principal ones with their symbols:

Hydrochloric Acid	HCl
Hydrobromic Acid	HBr
Hydriodic Acid	HI
Hydrofluoric Acid	HF
Hydrocyanic Acid	HCy
Hydrosulphuric Acid	H_2S

These six you will observe have no oxygen in their composition, while those below all have:

Common Names.	Chemical Names.	Symbols
Epsom Salts	Sulphate of Magnesia	$\text{Mg, SO}_4 + 7\text{H}_2\text{O}$
Glauber's Salts	Sulphate of Soda	$\text{Na}_2\text{SO}_4 + 10\text{H}_2\text{O}$
Smelling Salts	Carbonate of Ammonia	$(\text{NH}_4)_2\text{CO}_3 + \text{CO}_2$
Sal Volatile	" " "	" " " " "
White Lead	Carbonate of Lead	Pb CO_3
Red Lead	(Red) Oxide of Lead	Pb_3O_4
Saltpetre	Nitrate of Potash	KNO_3
Common Salt	Chloride of Sodium	Na Cl
Sal Ammoniac	Chloride of Ammonium	$\text{NH}_4\text{ Cl}$

I think these few will illustrate the system very well, and one of the chief characteristics I want to call your attention to is the italicized endings of the first words in the chemical names the *ates* and the *ides*. When the terminal is *ide* it denotes that one of the non-metallic elements has combined with one of the metals, as chloride of zinc, Zn Cl_2 ; this is a well known disinfectant and is also used

Sulphurous Acid	H_2SO_3
Sulphuric "	H_2SO_4
Carbonic "	H_2CO_3
Chromic "	$\text{H}_2\text{Cr O}_4$
Silicic "	$\text{H}_2\text{Si O}_3$
Phosphorous "	H_3PO_3
Phosphoric "	H_3PO_4
Arsenic "	$\text{H}_3\text{As O}_4$
Nitric "	HNO_3
Chloric "	HCl O_3
Boracic "	HBO_2
Nitrous "	HNO_2

Now these twelve oxygen acids have different endings, nine of the twelve end in *ic*, while the other three end in *ous*, and the six hydrogen acids above end in *ic* too, these endings have their signification, and effect the terminals of the substances they produce when they combine with metals or other substances, thus, sulphuric acid combines with iron and produces a salt called sulphate of iron—commonly called "green vitrol," and the reaction may be represented thus, $\text{H}_2\text{SO}_4 + \text{Fe} = \text{Fe SO}_4 + \text{H}_2$ here you see when sulphate of iron is produced hydrogen is set free, in fact it is replaced by the iron. This is one way of making hydrogen gas, but by using zinc instead of iron it is made purer and easier, and the product is sulphate of zinc—commonly called "white vitrol," its symbol is $\text{Zn SO}_4 + 7\text{H}_2\text{O}$; this $7\text{H}_2\text{O}$ is called its water of crystallization and is taken up from the water used to dilute the sulphuric acid—these metals are generally dissolved in dilute acids—The zinc as well as the iron sets free H_2 , and the iron as well as the zinc requires $7\text{H}_2\text{O}$ for crystallization although not shown above in symbol for sulphate of iron, in its crystalline state it is, $\text{Fe SO}_4 + 7\text{H}_2\text{O}$.

I have not given you all I promised in this paper, but I will endeavor to do so eventually, I will only say now that when the acid ends in *ic* the salt produced by its (the acid) combination with a metal or other body ends in *ate*.

If my readers will turn back to my last paper there is an obscure passage which you will find beginning on the 24th line from bottom of 1st. column on page 29. It should read—that 23 oz. of soda, or rather 39 oz. of oxide of sodium, require 44 oz. of carbonic acid just as much as 56 oz. of oxide of calcium require it.

WM. WAPLINGTON.

SIX MEN OF HINDOSTAN.

There were six men of Hindostan
(If sages' tales are true
Who rather plumed themselves upon
How very much they knew,
And intimated they could give
Old Solomon, did he but live,
A friendly tip or two.

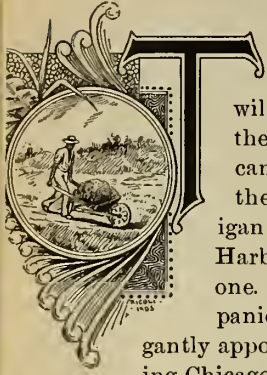
One day these men of Hindostan
Went out to take a run,
And carried big umbrellas for
Protection from the sun;
But up there came a jimmy-cane
With forty different kinds of rain
Before their walk was done.

And then these men of Hindostan—
These men of wisdom vain,
Shut all their big umbrellas up,
To keep them from the rain;
And though the torrents roared and poured,
These men proclaimed, "We can't afford
To put 'em up again!"

Oh foolish men of Hindostan!
As foolish as a pup—
What wonder jeers fill all the land,
While sorrow fills your cup?
And yet there are wise business men in U. S. A.
who have not learned that in advertising—like
handling an umbrella in a storm, to be successful,
You have to keep it up.

—Springfield (O.) Republic Times.

BRICK YARD SKETCHES.



THOSE of our readers who visit Chicago, and a great many will surely do so during the Worlds Fair, if they can spare a day will find the trip across Lake Michigan to St. Joe and Benton Harbor a very enjoyable one. Two steam ship companies run large and elegantly appointed boats daily, leaving Chicago about 9 A. M. and returning in the evening, giving ample time for dinner and a visit to the brick-yards.

AT BENTON HARBOR, MICH.,

They will find the enterprising firm of Ferguson & McCord operating two machine plants. One (the old works) has a stiff-clay outfit, including a Little Wonder machine, with Cunningham's automatic cut-off, which they commend very highly. They also make some drain tile when occasion requires, using a Kells & Sons auger machine. The clay is hauled from bank to machinery in queer little one-sided dump cars by horse power, and passed through a Potts Disintegrator, and then into the machine. From the machine the brick are taken on cars into a steam dryer erected by the Iron Clad Dryer Co., of Chicago, which does its work quickly and well. The frame part of this dryer has been carried up two stories, and in this building the drain tile are dried. The floors are slatted and the walls on each side are made to swing out after the fashion of top hinged blinds, which enables them to ventilate and dry rapidly in warm weather, or to entirely shut out damp air during wind or rain storms. They, like nearly everyone else, were hindered in the work during spring and early summer by the excessive rains, but their dryer enabled them to run most of the time regardless of the weather. Occasionally, though, their clay bank and approaches would become impassible, necessitating a short lay off. The demand for building brick has been good and the supply short, owing to the wet season, so that prices are now a little higher than usual, ranging from \$7 to \$8 a thousand delivered. Their new soft clay plant is located a mile or more or more distant from the old one, and is a very conveniently arranged, being equipped with a New Anderson machine and an outfit from

the shops of the Anderson (Ind.) Foundry & Machine Works.

MICHIGAN SAND BRICK.

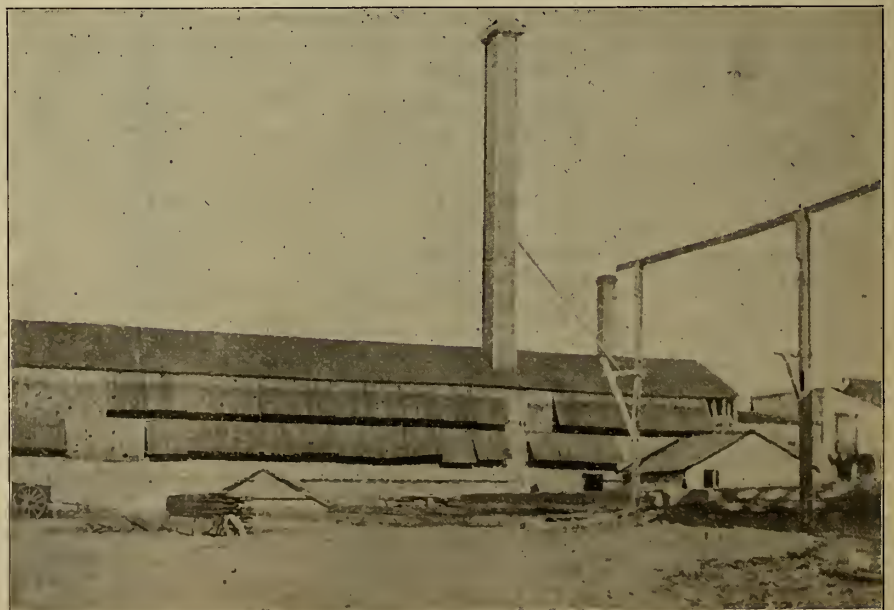
We have heard much of late about the manufacture of brick from sand, and therefore availed the opportunity of a visit to the works of the Michigan Sand Brick Co., which are located near St. Joe on the lake front, where there is raw material enough (so far as the sand goes) to supply them for many genera-



AN ODD END-DUMP CAR.

tions to come. We were fortunate enough to meet the president and general manager of the company, Mr. C. B. Field, a very courteous gentleman, who drove us out to the factory, which is a small unpretending structure well nigh buried in the sand from which its products are largely made. That part of the process which we were able to see is simple. The secret part of the work is the mixture with the sand of certain chemicals. Just what these ingredients are, of course, we have no means of de-

termining, but were told that the brick are composed of 75 per cent. of sand and 25 per cent. of—something else. After the mixture is made it is fed into a die machine which looks something like a dry press or a Sword machine, which presses it into the form of a brick. From the machine the brick are taken to racks under sheds where they are left to season or solidify. For a few days water is thrown on them to aid in the process of petrifaction, after which they are left exposed to the action of the elements and in the course of two or three weeks are ready for shipment or use. They are made in various sizes and colors and appear to be strong and durable. We give a view of a very pretty business front built of these brick. The front of the one story structure next to it is also constructed of them, and has stood for two years without the least sign of disintegration. Sand brick are only intended for use for front and ornamental purposes. They are too expensive for ordinary work, costing \$20 a thousand and upward. Mr. Field said he did not expect to monopolize the ornamental brick trade, but that he did anticipate a demand for them that would justify the erection of sand brick plants wherever there is a demand for front brick, and an abundant supply of good clean sand.



BRICK & TILE DRYER, FERGUSON & McCORD, BENTON HARBOR, MICH.

A DAY IN PEKIN.

Ten miles east of Peoria, Ill., is the thrifty little city of Pekin. The brick business here is not so important a part



MICHIGAN SAND BRICK CO.'S WORKS.

of the city's industrial interests as that of the production of jag juice. Still it boasts of two machine yards. We naturally first visited that of Snyder & Jensen, for the latter gentleman is an old friend, being a charter member of the N. B. M. A., and having attended every meeting of that association. We found him superintending the emptying of a kiln of hard brick. Among the first questions he asked was, "Where will the next convention be held?" and when in reply we said, "At Louisville, Ky., in January. Will you be with us?" He answered, "Yes. Sure. If you meet in China I'll be there, for I can't afford to miss a convention of brickmakers." Mr. J. D. Jensen now owns and operates the brickyard, his former partner, Mr. T. A. Snyder, having retired from the business, owing to poor health, and is now raising oranges in Florida. The brickyard was an old one, having been established in 1876. They first made brick by hand, but soon sought better ways and put in a Quaker soft clay machine. The clay not being well suited to that process, they changed the second year, putting in its place a Sword machine, which has been in operation ever since, and we found it, after nearly fifteen years of service, turning out good common brick at the rate of twenty thousand a day. The brick are taken from machine and laid on edge on cars which run on wooden rails and taken to sheds where they are piled five to ten high and left to dry, and afterwards wheeled

to kilns, which are common clamps, with permanent walls, Mr. Jensen also has a few small round down-draft kilns in which he burns them when an extra hard lot are wanted. These kilns, however, were erected for burning drain tile, which they make when the brick trade is dull. The brick are burned with coal and wood, whichever happens to be the cheapest, in seven days. Trade has been unusually active this year and prices fair, averaging \$6.50 a thousand.

A little way beyond Mr. Jensen's plant is the works of Mitchell, Merrill & Mitchell. Here, too, we were bade a hearty welcome. Their plant is very similar to their neighbor's, being an old plant, formerly run by a Mr. Hamilton. Last year they worked a stiff-clay, wire-cut machine, but their clay did not work well by that process, so they put in its place a new improved Sword machine, made by H. Brewer & Co., Tecumseh, Mich., with which they are well pleased. "It runs like clock work," said Mr. Mitchell, "and we are never annoyed by break downs, or delayed in any way by the machine." They dry and burn in the same way as their neighbor, and as the clay is similar, there is no marked difference in the product, except that their brick are a little smoother, owing, doubtless, to their machine being new and of an improved pattern.

HOMEWARD BOUND

We stopped at Danville, Ill., and visited the new paving brick plant being erected near that city by our old friend, J. G. Shea, who was among the first in his State to advocate the use of brick for paving streets and roadways, and to manufacture a brick suitable for such use. Mr. Shea has removed from Decatur, Ill., where he has been making brick and tile for many years, to Danville, in order to

take the active superintendency of the new plant, which is now well under way and will be completed and turning out brick at the rate of 50,000 to 100,000 a day by September 1. A full description of the plant will be given our readers in a future issue.

THE TINKERING CRANK.

There is a great deal of truth in what *The Manufacturers' Gazette* says about some men who never seem to be happy and contented unless they are tinkering. They are always watching for a chance to use a monkey wrench or hammer, and not only waste valuable time but do more toward spoiling the machinery in their charge than years of constant wear will ever do. If a machine is out of order or there is some part that needs tightening up or repairing, the tinkerer takes his monkey wrench and screw-driver and goes at it, regardless of where or what the trouble is. He spends an hour or two, twisting and turning nuts and bolts, and when he gets tired of this amusement concludes that everything is all right and starts up the machine, only to find that he has not improved it any by tinkering. Then he goes at it again.



SAND BRICK FRONT.

Such men are not profitable workmen. The competent and experienced man never tinkers. If the machinery needs fixing he does not go about it in a hap-

hazard manner, but looks it over carefully until he locates the trouble, and then does what is needed, without making a bad matter worse by acting upon the supposition that because one part is out of order the whole machine needs tinkering.

A NEW ENGINE.

THE readers of the CLAY-WORKER are herewith shown an illustration of a new Twin Engine lately put upon the market by the Chandler & Taylor Co., of Indianapolis, Ind. The illustration being taken from one which this Company built for Mr. L. A. Thompson, Inventor of the Switch-back Railway, which engine is to be used in connection with the Switch-back R. R. to be run in Jackson Park during the World's Fair.

This design of engines has advantages not attained in the single cylinder engine where uniform power and close regulation are required, and when the space to be occupied, and character of the ground will not admit of, or make it difficult or expensive to use a large fly wheel.

The arrangement shown consists of two engines, a right and a left hand, coupled quartering to crank wheels on one driving shaft. In this construction the out-board journal bearings are dispensed with, the crank journal of one engine serving as the out-board journal of the other, and the crank wheels being permanently fixed at the ends of the shaft and set quartering with each other, there is no liability of the power to hang on the dead center, thus insuring a uniformly steady motion under all circumstances.

On this account a moderate sized fly wheel can be used on this type of engine and indeed for many purposes; where extreme regularity and steadiness are not required the fly wheel might be dispensed with entirely and still main-

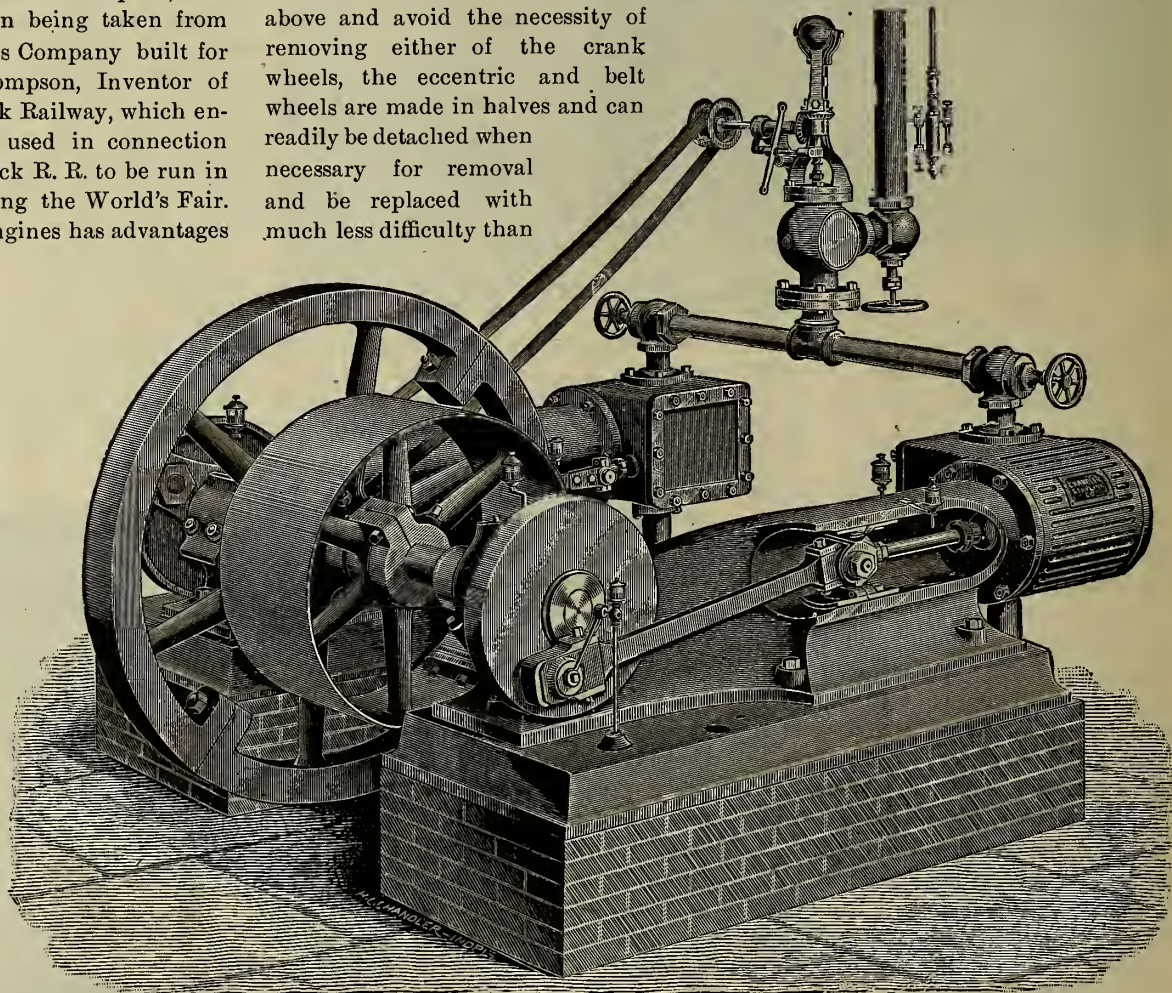
tain a comparatively uniform motion.

With double engines of this kind the working strains are more nearly equalized throughout the stroke than could possibly be done with the single cylinder engine, the work being distributed over two complete sets of parts instead of being concentrated on two single bearings of larger dimensions.

It will admit also of high rotative speed when desired, and for this reason it is especially effective for electric light plants and any use where high speed is wanted. To accommodate the construction of the crank shaft as described above and avoid the necessity of removing either of the crank wheels, the eccentric and belt wheels are made in halves and can readily be detached when necessary for removal and be replaced with much less difficulty than

may, when desired, have a link motion attached to the valve, thus becoming a reversing engine suitable for inclines and other purposes requiring power that will run either direction and start from any point of rest.

This Company are now building another engine an exact duplicate of the above for use in another of Mr. Thompson's Switch-back Railways, and, in addition, have built engines of this style, one of 130 H. P. for Wilmington, N. C., and one of the same power for Trimble, Ohio, the latter being to run a Brick Machine, one 100 H. P. for Boston, Mass.,



by taking off the crank wheels, which would not only be attended with some difficulty—as they are forced off by hydraulic pressure—but they would also be liable to disfigurement, and possibly disarrangement in replacing them. The engines are arranged and controlled by a single governor, and valves to shut off the steam of either engine without effecting the other.

With the exceptions named the details of construction of the Double Engine made by this concern are the same as their single self-contained engines, and

and one of 80 H. P. for St. Louis, Mo., and another for Memphis, Tenn., parties.

DRY CLAY BRICK.

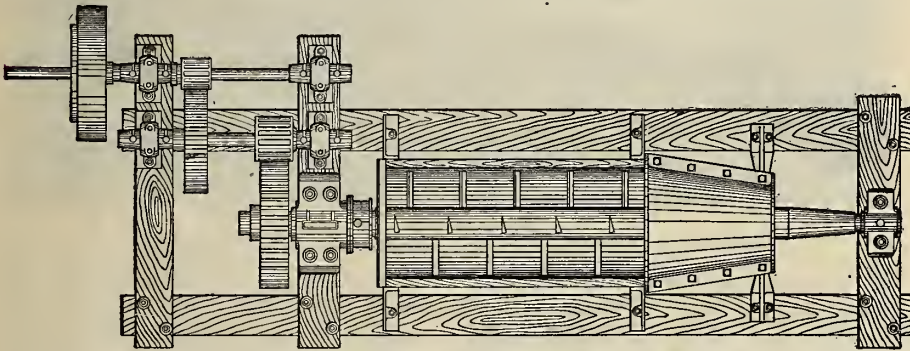
The making of brick by the Dry Clay Process is taking giant strides in the favor of the brickmakers of the country. This is unquestionably due to the fact that the inventive talent of the practical scientific brickmaker has wrought a phenomenal revolution in the machinery used, the result being machines, which, while they exert the enormous power required to press the dry clay into a

compact solid brick, are so adjusted as not to be self-destroying. Heretofore this seemed possible only with the well known St. Louis Hydraulic Press, but its great cost and the large capital required for operating such a Press placed it beyond the range of the majority of brick manufacturers. But thanks to the inventive genius of such progressive brickmakers, as, for instance, the President of the College Hill Press Brick Works, St. Louis, Mo., this state of things belongs to the past.

After he had invented and built for his own use the now famous "Triumph" Dry Clay Brick Press it was proven in the open competitive market that he could successfully compete with the Hydraulic Companies, the well-known largest pressed brick concern in the world. Thus the problem was solved, and now there exists the condition for the successful introduction of the Dry Clay Process for a great many localities, as the "Triumph" Press is now manufactured for sale by the inventor, Mr. Jos. J. Kulage, No. 1435 College Ave., St. Louis, Mo.

A NEW PUG MILL.

WE show in the accompanying sketch a New Pug Mill, which is just being introduced to the trade by Chambers Bros. Co., of Philadelphia.



NO. 2 "A" HORIZONTAL PUG MILL, WITH TAPERED CLOSED END.

This Mill has 7-inch diameter cast iron pug shaft carrying thirty steel faced pugging knives, secured by keys, and adjustable to any desired angle with the shaft. The rear of the tub is open to view and for the easy distribution of water over the material, while the front part of the tub consists of a cone-shaped cast-iron case surrounding the pug shaft. The pugging knives in the case make a broken spiral around the pug shaft and in forcing the well mixed and uniformly moistened clay through the narrower exit end of the case thoroughly tempers the material.

It accomplishes the purpose of a Mixing Machine and in addition tempers the clay.

It is countergeared, has large babbed bearings entirely outside of clay tub, a self-lubricating friction plate running in oil box to receive end thrust, and is fitted with friction clutch or tight and loose pulleys as ordered.

The whole Machine is mounted in a framing of eight inch square timbers measuring fifteen feet in length.

No. 1 "A" is same design of mill precisely, but has pug shaft nine inches diameter carrying forty-four knives and is mounted in frame of twelve-inch square timbers about twenty feet long.

No. 3 "A" is same design of Mill, with pug shaft 4½ inches diameter, carrying twenty-eight knives, and mounted in framing of 6-inch square timbers, about eleven feet long.

For more detailed description of Mill, prices, etc., address the manufacturers.

THE THISSEN-ARNOLD CONTINUOUS BRICK-KILN AND DRYER.

TAking into consideration all the advantages of this kiln over all others, it is undoubtedly the best. It is the best arranged, the most durable, the simplest, uses the least fuel, and gives the most perfect results in any clay, especially in the production of common

burning. The escaping heat from the cooling brick is successfully used for water-smoking the brick ahead of the fire, without extra expense for labor or fuel they are dried at the same place where burnt, without moving them.

To burn brick successfully it is necessary to have full control of the draft and perfect combustion of the fuel. Our kiln not only possesses these advantages, but it acts also as a smoke consumer, and the heat can be directed, at will, to any desired point. For vitrified paving brick our kiln has no equal, because no heat can escape, and it can be kept in the bricks as long as necessary. This kiln will last a lifetime, with very little expenditure for repairs. We now have a kiln of thirty-thousand daily capacity, in operation, and hereby cordially invite examination.

Description:—The kiln consists of an endless tunnel, which is lined with fire bricks on the inside to make it substantial, and divided in a series of compartments (18 preferred) by use of shutters and movable partitions which connect and disconnect in any compartment at any time desired. Each compartment has a draft channel in its floor, extending transversely across the compartment and further to the smoke chamber, where it is provided with a damper to open and close it. In the compartments these channels are provided with two plates, shorter than the entire width of the compartment, to slide over the top of each, by which means the draft is regulated from one side to the other or to the centre of kiln if desired. The firing is done from top of the kiln, through holes about six inches in diameter, in only one compartment at one time. The draft channel is open five or six compartments ahead of the fire, so as to consume the entire heat in the bricks, allowing none to escape. A shutter is drawn across the compartment in which the draft is open, thus making the burning compartments independent of the rest of the kiln. Ahead of this shutter the drying is done, with the escaping heat from the cooling brick, and the heat which is utilized from the sand filling over the burning compartments, by means of channels or pipes imbedded in the filling and extending the entire circuit of the kiln, being connected with each compartment. The channels are provided with dampers, and so regulated as to connect or disconnect them with any compartment, thus operating continuously with the fire.

The drying is done in the same man-

building and vitrified paving brick. Only very limited shed-room is required when the semi-dry clay process is used. Soft mud brick, of course, must be dried until they become hard enough to sustain their own weight when set in the kiln.

This kiln works continuously. In other words, when once in operation, it burns a given number of thousands every day in the year; and when properly operated, there will be no loss whatever in burning. It can be easily arranged for work summer or winter, without additional expense for manufacturing and

ner as the burning, and as many compartments are used as will consume all the heat. Then the draft is opened in the last compartment and another shutter drawn across, making the desired compartments independent of the rest of the kiln.

Ahead of the compartments drying, the setting continues, and behind the burning, the bricks are taken out.

The kiln gives the best of results in any kind of clay. It can be built, of any daily capacity desired.

For further particulars call on or address.

The Universal Continuous Brick-Kiln Company, 510 New York Life Building, or 425 Range Building, Omaha, Nebraska.

Gen. W. W. Lowe, President.

J. C. Du-Bois, Sec'y.

GRAPHITE, PLUMBAGO, BLACK AND LEAD.

A correspondent in the *American Machinist* says: If engineers, machinists and millwrights in general and pipe-fitters in particular knew of the good qualities of graphite, I dare say there would be ten times the demand for it. Its lubricating qualities are questioned only by the impractical and it is this quality alone that sounds its key note, so to speak. Let me describe a few of what I consider its most important uses. As above stated, its primary object is lubrication and it is to this fact we must credit good pipe joints and cool bearings. In making pipe cement, (or as I would term it, pipe smear), it is not necessary to use the best oil or grease, as it is the Graphite and not the body in which it is suspended, that makes the mixture valuable and the joint perfect. I use the drippings from line shaft bearings, caught in the ordinary way and mix it with the best Ticonderoga flake Graphite so that it can be applied with an ordinary sash tool.

During the past three years I have used about fifteen or twenty pounds of dry Ticonderoga flakes Graphite for pipe joints, cylinder heads, piston rod packing, etc.

Bolts, smeared with Graphite mixed as above, I have unscrewed after having been in the dampest places for upward of two years, or more, proving the antirusting qualities of Graphite. To cool hot bearings put it on as thick as it will mix with oil.

Almost any oil or grease will answer but don't use poor Graphite.

THE SHAWMUT CLAY MANUFACTURING COMPANY.

THE above named company is one of the pioneers in this field, and was organized in July, 1891, by Messrs. B. E. Cartwright, W. W. Mattison, D. Robertson and W. S. Ravenscroft, and is officered as follows: W. W. Mattison, President; R. A. Cartwright, Secretary and Treasurer; W. S. Ravenscroft, General Manager; all of these gentlemen constituting the directory. Their head office is at Ridgeway, Pa., and the works, a view of which is shown in the accompanying sketch, is near Shawmut, Elk Co., Pa.

Under the supervision of Mr. Ravenscroft, a practical brickmaker, the plant was laid out and work begun August 1st and on November 2nd, just three months later, the first brick were turned from the machine, and from that time until the present it has run without a hitch. The plant is equipped with a

to the pan. The whole operation, from the mining of the clay until the product leaves the plant, is down grade. The fuel used is natural gas, of which the company has an abundant supply.

The product of this plant is paving brick, the demand for which exceeds the supply; but it is the intention of the Company to extend their operations into far wider fields embracing face building brick of the buff, brown, red and mottled varieties, for which they have clays especially adapted, as well as sewer pipe and ornamental terra cotta.

They are now opening upon their tract, containing 6000 acres, a 9 ft. vein of high grade fire clay of the Benezette variety from which they hope to make a fire brick second to none.

NOT AN UNMIXED BLESSING.

When the half-holiday movement was first begun there was considerable sentimental gush about the opportunities



WORKS OF THE SHAWMUT CLAY MANUFACTURING COMPANY.

Carlin dry-pan, and revolving screen, a Freese pug mill, and "A Special" brick machine, from which the product is repressed upon two Raymond "Columbian" represses; the brick are then loaded on double-deck iron cars into and through an "Iron-Clad" dryer, and thence upon the same cars to round downdraft kilns 26 ft. in diameter holding 60,000 brick to the kiln.

The clays used in these works belong to the lower grade of fire clays and come from under the coal, the latter being first mined after which the clay is taken up and run down the same plane to the brick works, located a little below the coal chute, where it is dumped into a bin from which it is fed by two men on to an endless belt and conveyed thereby

for mental and moral improvement that would be afforded by it. The idea of some enthusiasts was that clerks and workmen would seize on this occasion for visiting libraries and art-galleries, and for general culture. As a matter of fact, it is found that they use the time in more or less harmful dissipation. The results is that their morals are injured and their capacity for work is lessened. The effect of the holiday on discipline and working power in many institutions is said to be markedly bad. —*The Examiner*.

The heights by great men reached and kept,
Were not attained by sudden flight;
But they, while their companions slept,
Were toiling upwards in the night.

—*Longfellow*.

CORRESPONDENCE.

THESE COLUMNS ARE OPEN TO ALL. THE FULL NAME AND ADDRESS IS REQUIRED BUT WILL NOT BE PUBLISHED EXCEPT WHEN PERMISSION IS GIVEN BY CORRESPONDENT. THOSE DESIRING TO COMMUNICATE PRIVATELY WITH ANY CORRESPONDENT WHOSE FULL NAME IS NOT GIVEN CAN DO SO BY ADDRESSING LETTERS CARE OF CLAY-WORKER.

Learning Something from Others.

Editor Clay-Worker:

In reading over the articles and communications in every number of the CLAY-WORKER, one finds much matter of great interest, and no matter how much a man may know, or thinks he knows about the brick business, he can glean something that is new. Some simple point will suggest a new idea that he had not thought of before. The same thing I have found true in visiting works all over the country, both great and small. I never went into a yard—no matter how insignificant—but what I could learn something. The man had thought of some little device for doing certain work about his machine or the yard or his kilns, for his own particular convenience, that immediately suggested the thought, "There is something I have been trying to think of for a long time—some way to do that particular work, and here I find this man, away in the back woods, has struck it, though in a crude way, but I see just where I can improve upon it and will go right home and put it in operation."

For this very purpose was the National Brick Manufacturers' Association organized; so that not only the brickmakers of works both great and small could meet together for the exchange of ideas, but where those who had given time and thought to the invention of machinery, for the working of different clays, could also meet with the user of these machines, and the mutual exchange of ideas from practical every day work be a benefit to all.

It is hardly to be supposed that all the articles in the CLAY-WORKER or any other paper will be practical in their entirety, for many who write, or like many (not all) who talk at the Brick Manufacturers' Convention, they have a theory, or a hobby, but in all their writings or their talkings, among all that is impractical you will find enough that is good; ideas which you yourself had been trying to solve into shape for a long time, but could not, to well pay you for the reading.

There is too much of the getting down into the old rut among brickmakers, and selfishly staying at home. It is all well enough to go to the National Con-

vention once a year, but better if you will steal off for a day or two now and then right in the working season, and go and visit your neighbors, and, unless you know it all, like some of the men Bro. Cray speaks of, you will find it pays.

My advice to those contemplating going into the brick business, be they old or young, is to spend a small portion of their experience money in visiting practical, ordinary yards, and learn a thing or two at the expense of those who "have been there before many a time," then start slow and right and they will have nine-tenths of their experience money saved up for Christmas.

DEACON TIDD.

Any Color So It's Red.

Editor Clay-Worker:

One of your correspondents, I notice, finds fault with the "whitewash" on red brick and suggests "buff" brick as a remedy. If he were in this city to-day I could show him buff(?) brick, pink(?) brick, gold(?) colored brick, mud-colored brick and various other—impossible to classify among colors—shades of light brick up to the common red and stock brick that are "whitewashed." I could show him "buff" and "cream" colored brick that have not only turned white, but also yellow and green, the latter probably, with envy towards some of their more fortunate and prettier looking red neighbors. "Buff" brick, even after being dipped in oil at the yards, "whitewashed" before they graced(?) the wall. Painted-in-the-yards "red press brick" made not many hundred miles east of this city, and red dipped stock made here, and common brick, all "whitewashed." I could show him old walls built with common brick, and newly painted in drab, on top of several old coats, that are "whitewashed," in spite of the several old and new coats of paint on them. This is not all. I could show him "whitewash" on the beautiful brown stone, quarried in the eastern part of the Keystone State, and on the brown stone and the white and buff Berea-grit rock, quarried in this state, and on the pink stone quarried in Michigan and the Lake Superior region. I could further show him "whitewash" on the justly famous Pennsylvania slate, on the roofs of the buildings, as well as on the mineral paints covering our frame structures. "Whitewash" is a near neighbor,

always and everywhere at home. "What is it?"

"Buff," or any other light colored brick, will not obviate this terrible "What is it?" which is by many—evidently owing to the color-blindness—only seen on the red brick. While there is much said against "whitewashing" on red brick, there is no mention made of the light colored brick turning yellow and green, nor is there any notice taken of the abominable dirty appearance the "buff" and every other light colored brick have after being in the wall a year or two in our busy and smoky cities,—and "May the Lord have pity" on cities that are not smoky.

Select a cheerful and warm colored red brick with a smooth, not sanded surface, nor of a cold gray stare, nor one that suggests iron-clad paint effects, of which we have so many examples in this city, and particularly avoid those painted or dipped in the yards—usually done to cover up poor quality of material, and you will have a permanently, pretty wall, one that "grows in the eye," never becomes monotonous, is as stable and everywhere as passable as a black suit of clothing, suggesting durability, strength of character and refined taste.

It is idle to talk about the "superior beauty" of light shaded brick; they won't wear; they become tiresome to the eye; soon look smoky; suggest shoddiness and a selfish desire of economy on the part of the builder.

These are fads, the like use of black-headers, with the mortar scraped out and common brick set in the wall, in a primitive and certainly tasteless way, of which we have an example in a building that is said to owe its ecstatic(?) appearance to the funds of the brewery on our "world famous" Euclid Avenue. Both intended by the skilled architects to "look ancient."

"Buff" brick are largely a fad at present, and, in some respects, a shrewd escape from defects of brick plants, located on clay banks, where ignorance considered good red clay existing, and upon disappointment began to buy bastard fire clays to mix with their inferior red to make a "buff." However, much as can be said against such brick, they have one great advantage(?) over certain kinds of red, in that they soon look grimy with which "whitewash" nor anything else can ever compete for ugliness.

Why not slack up ranting about "whitewash" and begin to talk of quality?

It cannot be denied that most of the light colored as well as most of the red pressed brick in the market to-day are but a slim excuse for the name of press brick. It seems as though many manufacturers were trying their utmost to see how poor a brick they can place under the title of press brick, and at a similar price. Such fellows seem to take advantage of the ignorance of the building public, and they do more harm towards the adoption of brick as a universal building material, than the no doubt temporary advantage to their pocket-books will ever amount to. Manufacturers who make a conscientious effort to put good building material on the market are retarded by such work, the building public gets deceived and brick as a building material is correspondingly condemned.

Let us have a brick that is more dense; one that makes a healthy wall, and until we have brick walls that are dry and healthy for the inhabitants, brickmakers, architects, contractors and builders should quit kicking against color, "whitewash," or any other dirt, for that matter, on the walls. Any one possessing ordinary skill in the manufacture of brick can make a porous "buff" or a porous red, but to make what should be made—a vitrified, damp-proof, fire-proof and in every respect an imperishable brick, requires something more than mere faultfinding about "whitewashing." Let the future brick be a vitrified brick, economy and the safety and health of the public suggest this and I venture to add, that with such a brick "whitewashing" will disappear.

T. S. G.

Cleveland, July 30, 1892.

The Dryer Question.

Editor Clay-Worker:

Referring to Waplington's letter to "R. Brick and William," on Dryers in June CLAY-WORKER, I am sorry that he, like "R. Brick," has no desire to enter into a controversy on the subject. A discussion on this most important matter, by these two able writers, would, I am sure, be both interesting and instructive.

"R. Brick" does not, as far as I can see, claim for the hot floor, "Superiority over, nor even equality to the properly arranged steam dryer." What he does claim, and I think with every show of reason is, that it is effective, economical and, where capital is limited, the only

artificial dryer within the reach of the manufacturer, being composed entirely of brick and clay, which is at hand.

I would also liked to have heard what Waplington had to say regarding the economy (or otherwise) in the generating of the steam; though I think very few boilers having only 18 feet in length, of heating surface, can now be found on the brickyards of the progressive manufacturers.

I "mildly protest" against the discussion of this question, being left in the hands of our friend from Hackensack. A few quotations from his June letter will, I think, convince the most sceptical of the justice of my protest:

"Weather all that could be desired; yards damp; brick do not dry well. Rain washed bricks."

"Molding when it does not rain. Looks heavy and dark in the North."

"Sun on a strike for the last three days; yards full of green brick."

"Showery; lots of washed bricks no work on the yards."

"Heavy thunder heard in the distance."

"For a change, for two days in succession we have had a severe hail storm."

"A heavy easterly gale blowing."

"Yesterday afternoon we had quite a shower."

"Time books on the yards show but six days made in two weeks; too much rain; a poor showing for the men."

"More rain; there are not over four or five pits of smooth bricks set yet. The only happy men on the yards are the engineers, as their time goes on rain or no rain, mold or no mold."

"Pale brick \$1.25 to \$1.50 per M., but like the sword of Damocles, hanging by a single hair, liable to fall at any moment."

Above extracts remind me of a story of a tourist in the Highlands, who, on being kept indoors for several days on account of bad weather, asked the landlord of the Inn, "Does it always rain here," to which he received the reply, "Na, Na! It sometimes snows."

I should think that the manufacturer who has a plant which he can work six days out of two weeks, while only paying his engineer full time must, in these times of close competition, be on the high road to fortune and success, especially if he is fortunate enough to have the old clamp kilns, which guarantee a large proportion of pale brick, worth \$1.25 to \$1.50 per M. (if the hair does

not snap), which price, I expect, almost covers freight to market, leaving only a very small balance to be paid by the manufacturer, for the honor and glory of having made them. This is without saying anything about the "lots of washed brick," or those returned to the soak-pit, thereby saving the trouble and annoyance of digging fresh clay every time.

Well may poor "Old Sol." exclaim, "Save me from my friends!"

*"Oh wad some power the giftie gie us,
To see oursel's as others see us;
It wad frae mony a blunder free us,
And foolish notion!"*

—WILLIAM.

P. S.—Like Mr. Waplington, I am always a gainer by "R. Brick's" letters. These "Hints" should be in the hands of every manufacturer of clay who can read the English language; and those who cannot read English, should have them translated into whatever language they can read.

While thanking "R. Brick" for the valuable information relative to hot floors, I would like to ask him if he thinks a dryer, such as he describes, could be partially fitted up with racks and successfully used as a combination of hot floor and drying shed; and if he thinks the radiation from a floor (made very thin—say six inches at furnaces to one at stacks) would be sufficient to dry ware, such as roofing tile, which has to be kept on pallets.

Trials and Tribulations Incident to Adopting Improved Methods on an Old Yard.

Editor Clay-Worker:

At length I have completed the erection of a six-tunnel Sharer dryer, after two years of letters, orders, difficulties, money expended and consultations, with a cost of \$20,675 of this country money, or about \$10,880 American gold. The first two months were employed in drying the building, making experiments; fearing always the loss of so much money and labor. Many times at first we took out cars with half the brick broken; sometimes, also, half the brick green (that is partially dry), and the other half perfectly dry and always broken. I was entirely discouraged, and repented undertaking the work, but as the dryer was not entirely finished, I always hoped that when the roof was completed and the six-tunnel flues up and sheeted that success would be complete also. It was so, indeed. Twenty

days ago the six tunnels of my dryer were filled with 30,000 bricks, upon iron cars and steel pallets, and fire started, and after four days and three nights of burning, we found the brick perfectly dry, safe and sound. That was a pleasure; the joy was spread throughout the yard, and that was a feast day here.

But pleasure and joy come not often and stay but a little time; are merely flashes of light that pass soon away, leaving us again sunk in this life's misery. The satisfaction and vanity of having performed well a new work in this country, and which promises a saving of money, and relief from much hand work in the handling of brick, and enabling me to deliver them to the market within fifteen days from time made encouraged me to continue studying the manner of laying my bricks in the best way to give good service, and struggle against the great inconvenience that an old plant arranged without system and no thought of the introduction of improved methods.

I fed in my imagination on thousands of illusions, thinking that once the dryer was finished and understood, it would do its job complete in two days and two nights at least, but, alas, this illusion was not realized, perhaps because my brick is delivered by the brick machine on edge, and thus hacked directly. It is not what you call stiff mud brick, but soft mud brick, and the dampness it contains is much greater than that computed by Mr. Sharer, when he said: "It will dry in twenty-four hours." The dryer now takes four days and nights for drying 30,000 bricks well, always taking out some broken brick, nearly 3 per cent., which is much less than the bricks broken in the hacks. Upon wood pallets brick is much more broken than on metallic ones, because in these last the brick slide easier when contracting by heat.

I am in no manner displeased with the dryer, on the contrary, it is better than I hoped for. I wonder at the simplicity of its plan, the great power of its furnaces and the good draft of the stack, which produces a strong current of heat, but we poor ignorant fellows working in this country, so far behind and primitive, are always condemned to find inconvenience everywhere, that prevent here three and two from making five, and these last months I have made less brick than in past years. However, I don't faint, and hope with practice to

overcome all these difficulties.

By annexing a pug mill to the brick machine I am making now a perfect and fine brick, though the same machine always before worked the clay directly from the bank tolerably well. The demand for my brick is more than I can supply, and this makes me still unhappy. Has any brickmaker in your great country found happiness complete? In my fancy that happiness consists only in stately kilns, from which bricks go out hard red burned, safe and sound. Where are there more pungent thorns than that multitude of bats that lie about spread round the doors of kilns at the end of every burn? Or a machine which should give a daily output of 25,000, without difficulty, and yet hear the superintendent saying: "Something is broken;" "clay is too soft and brick comes out very ugly;" "clay is too hard—stop the machine," or police arrest drivers as they haul brick through the streets, for having passed near an old woman." Such is the life of a brickmaker.

On the 31st of May I was reading and laughing over the humorous article of Mr. George Walker, "Causes of Failure," in your issue of April; on the first of June I was on foot early in the morning, and cheerfully set about filling a kiln in order to clear out my dryer, and not to allow it to rest a moment, for I desire it not to take my money for nothing. I reached the yard at six o'clock; a very fine morning, I assure you. One of the superintendents met me and said: "Do you know, perhaps we can do without kilns and work with the dryer only." "How so?" I answered him astonished. "Let us go down and see." We went at once to the dryer, and he showed me hacks of brick nearly burned of even red color, a great number of half bricks, smoked; pieces of wood pallets, carbonized; and warped iron cars spread all around, oxidized and destroyed by fire; even the rails of the tracks were spoiled. The cause of this incident was that, during the night, the stupid burner increased the fire a great deal, and more than 300 pallets that there were of wood took fire, making me a total loss of \$500. It was my birthday.

Bogota, S. A.

RICARDO CALVO R.

The Southern Situation.

Editor Clay-Worker:

The brick trade in Knoxville is dull, and is a fair index of trade all over the

South. At present there are signs of a speedy return to our former prosperity; building business begins to look brighter.

Cotton went to the bottom last winter (in price,) and iron floated to the top (in amount produced,) which caused such a drop in prices as the South had never before experienced. The speculators in Real Estate are coming to their senses and prices are more reasonable, which will induce purchasers.

Knoxville has let a contract for sewers which amounts to over \$200,000. Work to begin at once. \$300,000 more is to apply on streets and bridges. Tests are being made with brick for street paving, and are found satisfactory, and brick will undoubtedly be adopted.

The Hallwood Paving Block Co. of Robbins, Tenn., have put in a section on Gay St. Also Knoxville Brick Co. a section on Asylum Street, which seems to receive most favor with all concerned. A new suburb has been placed on the market by the National Building Co., and lots with new residences offered to the public on such favorable terms that every one can own a home who will pay rent. Property sold on five, ten, fifteen and twenty year's time; as purchaser may select.

By the time the political pot has 'boiled dry,' we will all be hard at work and happy. J. A.

Philadelphia News.

Editor Clay-Worker:

Philadelphia is growing, and so are all the outlying districts. Contrary to expectations the number of dwellings under contract for the first six months of the year has exceeded the number for the same period of 1891, when there were 2,259 permits with 5,120 operations, as against 2,390 permits and 5,885 operations for 1892. The number of public buildings, such as hotels, depots, etc. have been much greater than last year, and there are more fine brick in fancy colors, shapes, etc. used. Bricks of all descriptions have been very low, and profits quite narrow for the past five years, but it is confidently expected that fine press bricks now ruling from \$16 to \$18, common \$7 to \$7.50, will bear at from \$2 to \$5, more per thousand, and manufacturers will get it before the season closes. Then again it is believed that the season is too far advanced to render higher prices probable, as builders have, to a great extent, anticipated their wants. Stocks are lower in the yards than they

have been for several years, however, and manufacturers in consequence are very independent. If there should be any great rush for brick as the season advances prices will no doubt go a peg or two higher.

Manufacturers are now at peace with all their men, and there is plenty of work for experienced hands. The Dobbins strike has been declared off, and they are busy with a full compliment of hands employed, and orders are accumulating at that.

The Brick Laying classes of the Builders Trade school have been greatly reduced in numbers on account of the boys not being able to secure places after graduation. The apprenticeship question has been settled however, and the graduate will be given preference, and one year taken from the apprenticeship, the journeymen having yielded to all objections.

Comstock & Butterworth of Claymont, Delaware, have shipped 500,000 brick to a party in Cuba. The new firm have forged ahead very rapidly, and are now doing their full share of business.

The Whildin Pottery Co. has purchased a property on Wharton St. below Eighth upon which they expect to erect new buildings.

Geo. Carnell, proprietor of the Philadelphia Brick Machine Works 1819 to 1823 North Fifth St., is busy on clay tempering machines and his steam power brick press, fire brick presses etc. He is furnishing estimates for several machines to go to Foreign countries, and confidently expects to get the orders.

A very rich deposit of feld-spar and potters clay has been developed in Delaware County, and a company is being formed to operate it. A great deal of the former has already been taken out, and sold readily, principally to the Trenton Pottery Company.

Owing to increase in business the Jarden Brick Co. are now having constructed a brick machine by Chisholm Boyd & White, at Chicago, which will rival the world in the manufacture of that article in the matter of speed, efficiency, and the general quality of the output in tensile strength. This new piece of machinery will be operated under a pressure of six-hundred tons to the square inch, and will produce correspondingly compact and neat brick, besides superior in other directions. The Jarden Co. have sold over 100,000 gray brick for the Commercial Exchange, Richmond, Virginia, and also a quantity of Pompeian

brick for the same place; also about 100,000 buff brick for a Reading School house, also buff brick for John M. Sharps new hotel Cor. 12th & Arch Sts., and the new hotel for the same gentlemen at Broad & Locust Sts. They expect to be very busy from this time out, and have already sold considerably more brick than they did the whole of last year.

The brick for the tower of the Public Buildings when tested by a committee appointed by the commission, averaged about 500,000 lbs. to the square inch, and that was thought to be a remarkable pressure.

There is a very strong tone in building circles. The biggest project under consideration is a station for the Pennsylvania Railroad at Broad and Market Sts. It will be an immense affair, ten stories high; train shed 600 feet long; no contracts have as yet been given out. Our brick people will have quite a scramble for the business. The iron makers will of course have a large contract to furnish structural material. The Railroads hereabouts are all doing a big business, and are contemplating extraordinary improvements which means an enormous demand for brick after the present contracts are executed.

ANON.

Glazed Roofing Tiles.

Editor Clay-Worker:

In dealing with the subject of Glazed Roofing Tiles, it will not be necessary for me to enter into any description of the various shapes and patterns of tile used for the covering of buildings, nor for me to give any opinion as to their merits. All this has been done in a very exhaustive and able manner by Mr. Gibson, in his letters recently written to your journal and, also, by others who are interested in the manufacture of tiles and, therefore, I shall confine myself to the object of improving the tiles by throwing out a few suggestions about glazing them. In doing this, it will be necessary first to notice the glaze itself with a view of correcting a few ideas which appear to be in the minds of your readers respecting glazing and glazes. There was a question asked at your last convention as to whether ornamental brick were made with a glass face instead of a glaze or enamel and the answer was brevity itself on this subject. I suppose there were no chestnuts to distribute. Consequently, the answer was as brief as the question. So much so that I should think "Keystone"

himself could not but be fully satisfied. But in this brief answer there was a statement made which is an echo of a prevailing idea which those who have a little knowledge of glazes entertain. The gentleman in his answer said, all glazes are transparent. In this he was in error; some glazes are not transparent; some are opaque or semi-transparent and, therefore, will not show anything distinctly through them. They require a high temperature to flux them, but when fluxed they are very dense and firm; they close up the surface of the body on which they are put—literally taking up a portion of the body and knitting the whole compactly together, making the article impervious to water or any moisture whatever. These glazes have another recommendation; they can be made up for half the cost of really transparent glazes, but they can only be used on clay that will stand the fire required to flux them.

Another idea that is current is, that all glazed goods are impervious to moisture. This is a very general impression. I notice in an article on glazed brick, in April CLAY-WORKER, by an architect, that this idea is strongly set forth. In referring to this I only wish to draw attention to the fact named above. The several points regarding salt glaze, etc., will come under review in a future article on sanitary work. The architect says that a glazed brick would be utterly impervious to moisture, and this certainly is the general idea—that a glaze put on to an article will make water-proof that which would not be so without it. But this is not the fact. Really soft glazes that will flux at a low temperature and which are transparent, are not moisture proof in themselves. It is true that colorless glazes of this class will reveal any figure or decoration that is on the body under the glaze, and will greatly enhance the beauty of any such decoration, but if the article in itself is not water-proof, these glazes will not make them so. No doubt, some of your readers will ask, "Of what use is it to go to the expense of glazing roofing tile if it will not make them water-proof?" And I would ask the question, "What result do you expect from a roofing tile that is not in itself impervious to water without a glaze?" On this point I can only give my own experience which is, that a roof made with tiles of this class will drink in a certain quantity of water from every shower that falls upon it, and the par-

ticles of soot and dust that is floating in the atmosphere, will settle upon it and stick fast, and no subsequent showers, no; nor storms, will ever fetch it off, and that flowing and beautiful description given in your February number, of fire clay roofing tiles will loose a great deal of its force, and instead of the agreeable complement against the green of the landscape, it will appear as though it was making a very poor effort to imitate the green of the landscape mixed up a good deal with the color of the dust on the street below, and in five years (without the hundred), its decorative qualities will be lost, and its harmony with nature will be a thing of the past. This is what I see taking place with all the tiles made in this country, and while I fully admit the durability of tiles and a good many other things said in their favor over every other roofing material, yet tiles for general roofing purposes have been on the decline for many years in this country, and now slate is almost the universal covering.

There may be climatic reasons for the preference for tile roofing in your country, which I do not experience in this, but I venture to state that the disagreeable aspects mentioned above, will be found to go along with it and if this is so the only way to overcome them is by glazing, for a glaze has this feature about it. It will not allow any dirt to accumulate upon it. Every shower of rain will effectually clean it, and if it is a thing of beauty once it will be so forever, and if harmony with nature and decorative qualities to please the eye are things to be desired, it will be through the glaze it will be obtained, for this will maintain its first utility and beauty to all future ages.

There are three methods of procedure in the manufacture of glazed roofing tiles to which it will be my pleasure to call the attention of your readers in my next letter.

MANAGER.

The New York Market.

Editor Clay-Worker:

Homeward bound is the log on the good ship "Brick." The voyage has not been very pleasant so far. There have been times when it looked as though she would have to scud under bare poles, but she weathered all the squalls in good shape.

There had been heard mutterings of distant thunder by the Captains from the employes in the Architectural Iron trade, but they did not suppose it would

amount to much. The first indications there were that a squall was at hand, was on the 12th of the month, when the cartmen of Candee & Smith refused to deliver material to any job on which J. R. & J. M. Cornell and Jackson Iron Works were furnishing iron. It was not very heavy, but it came from a quarter wholly unexpected. In this case it stopped all delivery of brick. All the Captains kept a sharp lookout as they were sure to be in it in some shape.

On Friday the 15th, the Association of Building Material men took action in the matter, as one of their number was debarred from doing business, not because they wished the men to work longer hours or for less wages or that they should give up the union. A set of resolutions were adopted to be posted in the office of each. They simply voiced what every man in business can sustain—the right of a man to conduct his business himself. I submit them to your readers.

Resolved: That on and after July 18th, 1892, any person accepting employment with any of the undersigned firms must do so with the understanding and agreement on his part that he will execute all orders received from his employers or their authorized agents, and will not take any orders or receive instructions from any other person or persons.

Resolved: That this action is not intended to interfere with existing rates of hours or wages.

Resolved: That the undersigned will post a copy of these resolutions in all our respective offices.

MANCHESTER & PHILBRICK,	W. J. PECK,
CANDEE & SMITH,	Goss & Edsoll,
MARTIN & CO.,	JAMES ROGERS,
JOHN BELL & SON,	ALLEN & CO.,
NATHANIEL WISE,	MILLER & ROBINSON,
RUFUS DARROW,	CALVIN TOMPKINS.
W. H. SCHMOLL,	
MURTAGH & MCCARTY,	

The name of the largest firm in the city is missing—that of Canda & Kane, but not from want of sympathy; the absence of Mr. Kane in Europe may have been the cause, as they have formerly been in the "soup" as well as the rest of the signers. The peculiar man was among the names above. I was going to say that it might have been an oversight on his part not to post his notice in his office after agreeing to, for he did not and so far has not, and is delivering brick to his customers while the others are fighting to control their business.

On Monday morning, the 18th, the good ship "Brick" was struck so suddenly that the skippers did not have time to take in sail.

All building material yards tied up,

with the exception of one, not a wheel turning. She had run into a complete calm, but of an ominous nature, what would be the result? The motto "United we stand, divided we fall" if pushed in this case would make fair sailing for that portion of the craft that sells building material. There never was a time in the history of the trade that the tide was so favorable to settle a matter of this kind. The Building Material men are not overrun with orders, it will certainly entail loss, but not to the extent it would, if it were a lockout on their part. It is a sympathetic strike, and His Mightiness, the walking delegate, was shortsighted when he ordered it in the shape he did.

It is estimated that by the end of the week at least six thousand men will be measuring sidewalks. How long will that last? The major portion of them will be masons who never have any trouble with their bosses; carpenters cannot work; lathers have come to a standstill for want of material, and so it goes. As in the granite strike, great things were promised, nothing was accomplished but to go to work and work alongside of a non-union man, and very glad to get the chance.

The good ship has encountered more bad weather thus far in 1892 than ever before in one season since she was launched in the business world. Before this August, number reaches your readers, many of the Captains, in all probability, will have dropped anchor for 1892, as there is talk of stopping on the 15th of August. At New Windsor one yard has already finished molding. From information at hand, the peculiar man must thrive at that place. The manufacturers agreed last spring to take not less than \$5.00 per M at yard, as they have a good local trade with Newburg. The report is current that a contract for four hundred M was signed lately for a figure below \$4.00. Only a New Windsor brickmaker can tell whether there is any money in that deal.

Down town in New York City there have been a number of large building erected during the past six months that should have taken a large quantity of brick. As one looks at the reports in the New York papers from time to time, they would suppose that the trade is booming. The brickmaker has lost his hold, I am sorry to say. The output will be one-third less this season than last. The demand no better. Here is where the "Little Joker" comes in to

the injury of the brick trade, and must receive consideration in the consumption of brick, and that is the skeleton frame of iron now being used. A building that would, under the old order, require 40-inch side walls with a center wall of 20 inches from basement to roof is, under the new order, built without the middle wall and the side wall can be made very much lighter. The result is a decreased consumption of brick. Fulton has been honored by a monument for putting iron inside of wood, but the architect that evolved the idea of the iron skeleton frame to the displacement of brick need not look for a costly shaft to his memory from the brickmakers.

Figures are stubborn facts. I give your readers the number of permits for the first quarter of this year. It should be for six months, but on account of moving the Building Bureau, was not able to obtain the figures for the last quarter:

January, 1892, No. Buildings, 201, Cost, \$2,764,735.	
February, " " " 239, " \$4,850,853.	
March, " " " 400, " \$8,108,460.	
Total, 840, \$15,764,048.	
January, 1891, No. Bldg's, 142, Cost, \$3,282,933.	
February, " " " 222, " \$3,924,420.	
March, " " " 310, " \$5,651,520.	
Total, 675, \$12,859,273.	

Almost three million dollars in favor of 1892 and still demand no better. Iron the cause.

We will now see what Brooklyn has done toward the use of brick for the past six months of 1892 in comparison with 1891. 1891, Brick Buildings, 1038. Frame Buildings, 1296. Total 12334. Cost, \$12,330,827. 1892, Brick Buildings 1021. Frame Buildings, 1359. Total, 2380. Cost \$11,953,084.

As the best part of the building season is over, Brooklyn's showing of 46 more buildings in 1892 than 1891 is a small increase and \$377,743 in value less than the six months of the year previous shows that the houses, if more in number, were smaller in size. In New York City no frame houses can be erected.

The yards here are running about as last year with one exception. It only run two machines a day last season, this season it is running three.

The only BRICK FACTORY in our vicinity is at Mountain View, on line of D. L. & W. R. R., Patterson, N. J., consumes all of its product. I believe it is called the U. S. Brick Co., at least that is the name signed to the advertisement in the local papers for some one to lease it, as the present management has had

all the experience desired with patent "fixin's." The talk is that they have had an offer and if it is accepted the present plant will be taken down and a good old yard of our "Daddies" will take its place.

Tobacco built it and furnished the means to run it for a while. The ultimate result of so many model men and improvements were that it went into the hands of a receiver and the next move was that he made application to the court for the right to issue one thousand dollars worth of receiver's certificates to carry on the yard, which request was granted. Whether those have been exhausted and the plant is idle your scribe knows not.

W. R. O.'s account of the model yard with model superintendent is good.

Never mind, J. A. S., you will have lots of company at the "Pearly Gates." You, no doubt, have heard how Thad. Stevens was treated by St. Peter and his Satanic Majesty. The Devil finally gave him some matches, sent him off by himself. Just so, neither of them will have the brickmaker, but will tell him to go and wall himself in with his misrepresented brick.

A. N. OLDTIMER.

Hackensack, N. J.

Ohio Valley News.

Editor Clay-Worker:

The Ohio Valley Clay Co. of Steubenville, manufacturers of glass melting pots, are making some changes in their management. Superintendent Brown has resigned and has gone to New Mexico. His successor has not yet been elected.

John Porter, the pioneer fire brick manufacturer of New Cumberland, and formerly president of the mammoth John Porter Brick Co., has been nominated for Sheriff of Hancock Co., West Va., on the Republican ticket, and his election is assured.

There will be a meeting of sewer-pipe manufacturers at the Hollenden in Cleveland, Ohio, August 8, to effect an organization. There is a demand for all the pipe made, but satisfactory prices do not seem to rule.

The South Zanesville Sewer Pipe and Brick Co., of South Zanesville, Ohio, have increased the capacity of their plant to 75,000 pavers per day.

Carrollton, Ohio, has a new and important manufactory in the Carrollton Clay Works Co.

Martin's Ferry, Ohio, on July 15th received bids for paving Jefferson and Broadway, the main thoroughfares of the city, with vitrified pavers. Malloney Bros., Bellaire, O., were the lowest bidders on Jefferson St., and C. C. Cochran, Martin's Ferry, received the contract for Broadway, at 89½ cents a square yard. The brick will be supplied from Toronto, Ohio, and New Cumberland, W. Va.

The following prominent manufacturers were present in the interest of their products:

Fred Owensney, of the Great Western Fire Clay Co., Toronto, Ohio; Frank Bowles of the Calumet Fire Clay Co., Calumet, Ohio; Chas. Schanble of the New Cumberland Fire Clay Co., Browns, Ohio; E. A. Freshwater, Anderson, W. Va.; Captain G. A. Coleman of the John Porter Co., New Cumberland.

The Ohio Valley Fire Clay Co., of Toronto, have built two large additions to their works. These works have now a shop 60x200 feet. They have added a new press and doubled their capacity.

The survey of the proposed extension of the New Cumberland R. R. Branch was completed a short time ago, and the contract for the work has been let.

This road is one of the Pan Handle's best feeders on account of their numerous brick works, and this extension will open up an unlimited territory of the famous West Virginia fire clay.

A mile of street paving was let to John Bates, of Steubenville,—at Mansfield, Ohio, at \$1.39 per square yard.

Shipment by water, of sewer pipe and brick, have ceased, owing to the low stage of water in the Ohio River.

A. BUCKEYE.

A Natural and Economical Dryer.

Editor Clay-Worker:

Recently the question of drying brick has become one of importance. Every patent dryer claims to be the best one. Each, and all, no doubt, have their peculiar merits. I have been requested to say something about drying brick and dryers.

DRYING BRICK NATURALLY OR ARTIFICIALLY.

That all coming brick plants should and must make brick of dry clay, or else dry brick by artificial heat and air, there is no doubt. It would be a waste of time and money to dry dry pressed brick in a dryer.

If clay be properly dug and stored under a suitable shed, for dry press machines, I can see no gain in putting the brick in a dryer.

If brick be dried in a dryer and set in a kiln, in one week they will absorb as much water from the atmosphere as will be found in common dry pressed brick.

ALL DRYERS HAVE THEIR PECULIAR MERITS.

There may be a dryer that will suit all kinds of clay, but I doubt it. The most perfect and natural way to dry a brick is on a pallet, under a shed, where the air is about 80° F., and a good, free breeze of air passing, sufficient to carry off the water as fast as absorbed by the air. A very sandy clay may be dried rapidly, but in all cases, if the natural process of crystallization of the particles of clay be disturbed, the strength of the brick is impaired. All brick burners know this by the fast or slow water-smoking of a kiln. One of the surest and best ways to dry brick is on a hot clay floor. This is made best by a continuous series of cross return flues under bottom of a shed, with openings at the top for escape of vapor. I have seen soft mud brick dried in twenty-four hours perfectly, in this way. It is the most natural and economical plan. I can give a sketch of it in my next writing if desired by readers of the CLAY-WORKER, but I will here give a description of a shed with smoke flues under the bottom. I will say, build a shed 150 feet long, 22 feet wide and 7 feet high, weather-board the sides tight, leaving an opening or sliding door every 10 feet. The roof nearly flat, covered with tin, or other suitable roofing; put two rows of sky-lights, running lengthwise of shed, lights say 10-inch by 14-inch glass, 2 lights in suitable sash to keep out rain, and raised 4-inches only above the roof, so as to let out vapor. The lights should be about 3 feet apart. In cold or wet weather side doors of shed should be closed, in warm, clear weather, left open.

Now, we will suppose that four or more of these sheds are built with space of twenty feet between. At one end of these sheds a smoke-stack of brick is built, so as to afford a draft. At the other end of the sheds are furnaces, running across the shed, and connected with a continuous returning flue, crossing the shed at right angles with length of it, and built three feet apart and twelve inches square in clear. It may be covered with tile, or brick arches. All the flues to be covered with clay three inches deep. There must be an opening left at the side end of each cross flue; this opening to be about the size of the flue, and closed only when the soot in the flues have to be cleaned out from both sides of shed. It will be seen that the return cross flues will have a run of about one thousand feet from the furnace end of the sheds to the stack for draft, to which proper connections are made.

The smoke-stack will have a closed door at the bottom, so that it can be opened and a fire made and kept up two or three hours before fire is to be started in the furnace, that is, to heat the flues, then the door to be closed tight. This leaves the body of the smoke draft stack full of hot air inside, so that when a fire be started in the furnace end of the flue, the vacuum in the stack will draw the smoke from the furnace.

After three days of moderate firing, the whole bottom of the shed will become dry and as hot as wet brick will need for rapid drying. The shed will hold 10,000 brick, laid on the flat; about 20,000 set on edge, and will be dry enough to set in kiln in 24 hours. After the bottom of the shed gets hot a very little fuel will keep up a good, steady heat, in all respects better and cheaper than by steam, which costs much more, and is liable to disorder. The temperature in the air in shed will be about 100° F.—the temperature of bottom of floor of shed about 160° F. The hot clay floor absorbs the water rapidly from the bottom of the brick, while the hot air above dries the top and sides of the brick, so that the process of drying is natural, and does not interfere with the proper crystallization of the wet clay.

FOR THE SOFT OR STIFF MUD BRICK MACHINERY.

The sheds, as above described, are economical and perfectly reliable. Fuel that will make little or no smoke is best to operate these sheds, but in the absence of this, any kind of hard wood will do well.

J. W. C.

St. Louis News.

Editor Clay-Worker:

Building operations here, in and about St. Louis, continue to keep all contractors and brickyards busy, and permits are issued for new, large buildings every day. Neither the Union Depot nor new Hotel jobs have been let yet. A 14-story building is to be erected on 7th and Olive Sts., for which the Hydraulic Press Brick Co. will supply the brick.

The big demand, however, has had no strengthening effect on prices. The market price of merchantable brick is nominally \$5.75, but \$5.25 is more frequently the price paid, while strictly hard bring only \$7.00.

Buff brick continue to gain in popularity, and every new down-town job let has buff face brick specified. The brickwork on the Famous and Knox buildings is completed and it is about the handsomest building in St. Louis.

The new paving brick company, organized by Messrs. Purington, Sterling and others is progressing nicely, and the contracts for the construction of the works, kilns, etc., have been let, but the projectors of the enterprise are too ex-

perienced in yard building to say when it will be ready to begin work.

The new yard of the Illinois Supply & Construction Co., at Collinsville, Ills., is about completed and they expect to start up in two or three weeks.

The Hydraulic's new yard at Menominee, Wis., is getting along in good shape. Mr. W. H. Elliott was up there last week, and Mr. Sterling, who has just returned from his European trip, is up there now.

The Illinois Supply & Construction Co. report business progressing very nicely. They are now turning out from 45,000 to 60,000 brick per day, and in addition handle about 10,000 per day made in other yards. They have been very successful in the large jobs they have bid on, and have just secured a large church in North St. Louis, and the big engine house at the Chain of Rocks, in addition to several fine residences.

Evans & Howard have completed their new office, everything in it being of their own manufacture. They for some time have been manufacturing a line of speckled face brick, which they are now preparing to push. They are made of wet clay, in Roman, and the usual shapes, and the points claimed are strength in texture, a light absorption of moisture, failure to discolor, non-liability to become mouldy, or spall or crack under pressure, and also their ability to furnish in any ornamental shape desired. In sewer-pipe, they report business as excellent, one of the large contracts just secured, being from the city of Austin, Texas, which calls for over twenty miles of pipe.

W. H. Elliott, of the Hydraulic Press Brick Co., has left for Alaska, where he expects to spend a very enjoyable vacation.

Mr. W. L. Louderman, of the Illinois Supply & Construction Co., is enjoying a vacation in the lake regions of Michigan. Mr. McEwing, of the same company, has just returned from a short visit in the neighborhood of Cheyenne, Wyoming.

The Winkle Terra Cotta Co. have just completed a three-story, 74x104 brick addition to their plant. They have been exceedingly busy all summer. They had the big Famous job, and have just secured the 14-story job on 7th and Olive Sts., which will take twice as much of their product as the Wainwright building. Among other nice jobs recently secured are the Ticket office of the Chattanooga, Nashville, St. Louis R. R., at Chattanooga, the Kenton Club, at Louisville, churches at Lebanon and Centralia, Ills., and a school at Venice, Ills.

TERRA COTTA.

HINTS TO BRICKMAKERS.

How to Eliminate Caloric From the System.

YEARS ago when I taught an art class for a subsistence—which is, as you know, the next thing to living on one's wits—I used to take my pupils out to a brickyard near Lakeview, there to study nature coupled with the works of man. I tried thus to instill in the minds of the budding artists under my care a love for those right angles so well afforded by the modest building brick.

My favorite time was in the middle of August, when the sun added so many reflex tints and concentrated shadows to the picturesque lives that were embodied in the nooks and corners of the brickyard. I simply sat under my umbrella and superintended the eruptions of genius on the part of my pupils. But somehow it is hard to imbue some minds with those innate requirements so necessary to the true realization of art. Some of my pupils actually asserted that the brickyard was but commonplace. After a week they quit me for a professor of art who taught them to paint impossible foreign castles (that hadn't a bit of brick in their construction) on plaques and panels. Only one of my budding artists remained to receive the inspirations exuded from my master mind. She has been budding, I should say, from thirty-nine to forty-one years, and was the most prom-

with her, proposed marriage and wedded her. I was disconsolate; a drawing and painting master with nary a pupil. And like most successful professors of the art of painting I knew nothing about painting myself, and could not even drown my grief in paint. However, the foreman gave me permission to spend my leisuse mid-summer weeks in the pleasantly melancholy seclusion of the brickyard.

I built myself a tent of brick and a bed quilt, and passed much of my time watching the schooners while they were being loaded. I also made those experiments in keeping cool in hot weather which promise to make my system famous the world over. In condensed form the rules which I have especially formulated for brickmakers are as follows:

RULES FOR EVADING THE HEAT.

1.—Sleep under eider down quilts,



BRICKYARD BLISS.

thus keeping the heat out. Keep a hot brick at your feet.

2.—Drink a pint of three-star brandy raw immediately on rising. The brandy dissolves all the heat particles and fills up all the crevices in the human system into which the sun's rays might creep.

3.—Eat hot soup and mince pie for breakfast. Finish with a hot rum punch.

4.—Walk briskly thrice around the brickyard, keeping on the sunny side of the yard. This is termed the "Bluffing the Sun" treatment.

5.—Wear arctics and earmuffs as a precaution against sunstrokes and malaria. Drink hot scotches.

6.—If you are one of those whose partisanship is proof against conviction get

up a mid-day political discussion with the man who is invulnerable to argument. Treat him to hot toddys until he is speechless.

7.—To insure a coolness at home tell your wife her mother didn't know



A VACATION IN BRICK.

anything about bringing up children or anything else.

8.—At 6 P. M. reverse the treatment, and start over again, resuming until midnight.

There are nine other rules, but they cost extra.

CHAS. LEDERER.

NEW INVENTIONS.

The following is a lists of patents appertaining to brick, tile, terra-cotta, sewer pipe, pottery, etc., and the machinery used in their manufacture, issued since our last number.

- 477,632. Composition of matter for Brick. A. S. Baker, Sandy Creek, N. J.
- 477,915. Brick cutting machine. J. A. Snell, Barrington, R. I.
- 477,993. J. Conley and J. M. Wolfe, Tarkio, Mo.
- 478,136. Brick or tile die. Geo. C. Skinner, Troy, O.
- 478,171. Roofing tile. Jos. Rapp, New Philadelphia, O.
- 478,367. Brick or tile machine. John C. Titus, New Bremen, O.
- 478,436. Cutter for brick and tile machines. O. W. Johnson, Bucyrus, O.
- 478,481. Brick and tile machine. John Thompson, Bucyrus, O.
- 478,612. Paving Brick. De Haven Lance, New Cumberland, W. Va.
- 478,625. Brick press. Samuel McCarter, Norristown, Pa.
- 478,915. Brick machine. Walfrid Burkman, San Francisco, Cal.
- 479,021. Enameled brick and process of making same. I. T. Rue, Matawan, N. J.
- 479,159. Brick cutting machine. Eugene Stern, Helmstedt, Germany.
- 479,365. Process of plating clay with glass. A. A. Houghton and R. D. Haines, Corning, N. Y.



ART VS. LOVE IN A BRICKYARD.

ising of my class from the start. But just as she had fully begun to grasp the true asthetic outlines of the ruddy brick, the foreman of the drying department of the brickyard fell in love

THE CLAY-WORKER.

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T. A. RANDALL & CO.,

81 Massachusetts Ave. Indianapolis

ART IN BRICK.

The cause of brick building, is now receiving artistic attention. *The Brick Builder*, a journal published in Boston, has taken a high stand in this matter and is reproducing designs from the best foreign and domestic examples. We have had, during several years past, many concerns that have made ornamental brick work, so called, and while all this has had its missionary influence in showing people that something more than plain common work can be done in brick, the field for this sort of work, is sure to become narrow and is not helpful to the cause of artistic brick work. In taking up a catalogue of a manufacturer of ordinary brick, we find designs of all kinds, having little artistic merit, being carelessly designed and showing a mere disturbance of the surfaces, rather than proper decorative effects. Take the egg and dart mouldings for instance. It is seldom indeed that we see a carefully made design for this moulding. When carefully made, it is beautiful; when carelessly made, it is clumsy and uninteresting. There must necessarily be a distinction between that which is ornamental and that which is decorative. To use brick in a decorative way, naturally, implies that the details of the design have a definite relation to the entire composition. Take a doorway, for instance: While the decorative work on that doorway may be well formed, and o good and carefully modeled out line

yet it may have a very improper relation to the entire composition and in that way fail of the best success. It is a pleasure for us to notice that a manufacturing establishment of Boston has gone into this work in a proper spirit. They have employed the best architectural ability to design door-ways, mantels and other features together with the details which are necessary to bring about the proper architectural success. Then these designs have been turned over to the best modelers in the country, who have carried out their work in a highly artistic spirit. From these models, proper moulds have been made, and the result as shown in their book of sketches is highly satisfactory. While it is not to be expected that architects of ability will choose a door-way, here or a mantel some place else, or a window cap of a certain designated number, it is easily understood that such a practical demonstration of what may be done, offers encouragement to work out or adapt artistic designs, with a view of having them executed in this highly artistic manner. Surely the Clay World moves.

EXPERIMENTAL ORGANIZATIONS.

Our able contributor, "R. Brick," in his "Hints on Brickmaking," on page 125, speaks of a training school for clay-workers. The work he suggests as properly belonging to the National Brick Manufacturers' Association is, in France, done under the direction of the Government. It being assumed, to a certain extent in that country, that the Government may best do for the people that which they, as individuals, cannot do for themselves. The Government has many schools of handi-craft, as well as agriculture and other scientific educational institutions. The French Government has done not a little work in clay and in many other lines has conducted experiments for the public. It is true, as our contributor says, that thousands of dollars are wasted by individual experiment; that something more than a practical brickmaker is needed. The man of practice understands only that which he has handled. For the most part they work along in prescribed lines, knowing that many things are true, but knowing the reasons of truth in few.

Those who are in the brick business are seeking to get the money out of the clay. There need be no enthusiasm about it. What is wanted is facts and

facts of their relation to the business of making brick, which is a part of the general business of making money. As it is, there is a great deal of clumsy work.

We have in our hands the photograph of a kiln which cost one of our subscribers ten thousand dollars and has not produced one dollars worth of merchantable clay work. It was the result of the work of an expert (?)—A brick works engineer who claims superior knowledge, but who unfortunately for his victim, is a theorist. Professional knowledge and scientific knowledge combined with practical knowledge is what is wanted by the brickmaker. The knowledge of clayworking may be formulated, and the business of clayworking thus made an exact science. Thus far it has not been done. The reason is, that the experiments have been for the most part unscientific, disconnected and local. A great deal of valuable work has been done, but thousands of dollars have been spent by individuals where it might have cost the individual only a few dollars had the experiments been conducted through a training school by the Government or other organizations. We thoroughly believe in organizational experiments. We know that it will save a great deal of money and will be for the general benefit of all who are engaged in working clay. An organization of the right kind, be it a training school under the administration of the National Association or an experimental station, operated by the Government, or an experimental organization furthered by the National Association, will save to the individual brickmakers of the country, ten dollars where it will cost one. Without suggesting methods, or approving any particular plan, we wish to affirm directly and specifically that we believe in, commend, and will support any feasible organization or plan which looks to organized experiment for the benefit of the clayworkers of this country.

GUARANTEES OF MACHINERY.

Guarantees are expected on nearly all grades of machines which go into brick-yards. Under proper conditions a guarantee is all right and is expected. However, no manufacturing establishment can undertake to guarantee the man who runs the machine unless they furnish the man. When one has placed a large number of machines in various

yards and the machines have done well, he feels safe in making a guarantee; and when complaints come to him that all that has been promised of it has not been fulfilled, he is not greatly disturbed. He knows that there is something wrong with the man who is operating rather than with the machine. There is a great deal of injustice connected with the guarantee system.

In the first place, no one is going to make a bad machine continuously if he knows it. When machines go out for the first time, there is necessarily some uncertainty as to what they will do. After they have gone out for the fiftieth or one hundredth time and have been in satisfactory operation, the burden of proof is on the user of the machine and not the manufacturer. To be sure, there are the varying conditions with respect to the character of the clay and all that, and other local conditions, but in course of time all of these things are met.

It is well known that, with many workers in brickyards there are always those, even among the proprietors and foreman, who are prejudiced against all new things. Any change that is made is opposed. Oftentimes everything is done that can be done to keep a new machine from working. This is unjust; at the same time, is not uncommon. We think the manufacturers of clay-working machines should expect a guarantee at the same time that they give one. They should expect a guarantee of intelligence, unprejudiced and skilled, in the operation of the machine, and, in default of this, a penalty to the advantage of the machine maker should be expected. It is certainly a disadvantage to the machine maker if his machine is not skillfully handled, and where failure is the result of carelessness or indifference, or incompetency, those at fault should be held responsible.

OVER-PRODUCTION.

There has been not a little capital invested in brickmaking during recent years. The manufacture of brick has almost undergone a revolution. It is not long since it was a road-side industry. A few old plug horses, a mud wheel, some carts, sheds that would not shed water, some clumsy workman and a boisterous loud talking boss, formed the equipment of a road-side,

mud-side brickyard. Now we have a different equipment. Capital and brains have wrought great changes. Brickyards are owned by business men who do their work in a business way; exact, scientific, neat, labor saving machinery takes the place of hand labor wherever it is possible. Where cost can be reduced a few cents, expenditure has been made to bring out such results. The brick business has paid. Money has been made, and is being made in reasonable quantities in all sections of the country. This is a significant fact. It calls attention to the future. There has been a great deal of surplus capital seeking investment. A great deal has gone into the brick business and more is going into it, and as sure as fate there will come a time of over-production.

There will come a time when there will be a changing of dollars for dollars; no profits possible; a time when certain quantities of brick will be sold at a positive loss, and all because the brick business is paying at the present time. People who have surplus capital, say, "here is a time to invest money." They invest it, and they add to the supply of brick. Those who are operating yards and making money say, "If we double our capacity we will make twice as much money," and on goes the blind march. In the end there will be a reaction. It has happened in other lines of business and it will happen in brick business.

What are you going to do about it? may be asked. Shall we cut down the supply? Shall we refrain from extending our plant? Not so. March along with the procession, but bear in mind the future. Study to improve and increase your output, to attain the maximum of production at a minimum cost by the use of improved machinery and appliances, or be ready to make something else; roofing tile, special brick, enameled brick, or other clay products. Do not wait for bankruptcy to notify you that a mistake has been made. Bear in mind that the brick market is certain to be over-worked, and when the time comes be ready to meet it.

TALKING HIMSELF OUT OF IT.

A few days ago we were catechised in regard to glazed and enameled brick. We were talking to a brickmaker who evidently had been thinking about what the CLAY-WORKER has had to say about the manufacture of glazed brick. He

was trying to argue himself out of the glazed brick idea. He had been undertaking to show himself why glazed brick should not be made. He had been absorbing certain statements which had been made to him, which were antagonistic to glazed brick and enameled brick, and he had been shedding information and facts which came to him from other directions. He said: "Don't you know that glazed brick are not used outside in the Old Country?" We said to him, in order to bring out his ideas more fully: "What do you know about it?"

"Oh," said he: "I know that glazed brick or enameled brick are not used to any extent in the outside of buildings in England and France. They are used to a modern extent on the inside but very little on the outside. The glazing does not stand the frost. It would be unsafe to make glazed brick and use them in this climate." In our turn we said: "We know you are badly mistaken. Glazed brick are very extensively used throughout the United Kingdom and on the Continent. There is no trouble with glazed or enameled brick on account of frost." Still he was not disposed to accept it. That was not the kind of testimony that he was after. We said: "How about the glaze on a sewer-pipe or a jug? Did you ever see a glaze on a jug that was cracked from exposure to frost? Does it hurt sewer-pipe, or rather the glaze on it to be exposed to freezing and thawing? Have you not seen glazes and enamels on tiling on the outside walls of buildings or in exposed vestibules? Do you not see glazed tile, enameled tile, and enameled brick in buildings in our own town exposed to the elements, under all of the conditions which you say are uncomfortable to them?" There could be nothing but acknowledgement to this. "But," he said: "I would rather make a common brick; make lots of them, sell them at a moderate price, and not be dabbling in a glazed brick business." Of course it would not do for everybody to go into the manufacture of glazed or enameled brick. Everybody will not do it. A moderate number will have to do with the manufacture of this much sought for material, and they will do well by it. There will be money made. Just now there is a great demand for common brick, made in a common way, and it is paying a fair profit. At such a time we need not expect much variation or departure from the regular and accepted methods. Time will tell, however.

TRADE LITERATURE.

FIRE PROOF BUILDING MATERIALS is the title of a beautifully printed catalogue, recently issued by the Raritan Hollow and Porous Brick Co., No. 874 Broadway New York. It not only illustrates the great variety of fire proofing that this company now manufactures, but also contains much matter that can not fail to interest the student of Burned Clay as a constructive material.

BUILDERS' & TRADERS' HAND-BOOK. We are indebted to James John, secretary of the Builders' & Traders' Exchange of Chicago, for a copy of that associations 1892 Hand-Book. It contains a classified list of members, catalogue of the Exchanges' Library, a list of Chicago architects and a copy of the Lien Laws of Illinois, and much other valuable information on matters pertaining to building. We presume a copy will be sent free to any of our readers who apply for it to the secretary.

VENTILATE YOUR FACTORIES AND SHOPS is the title of a quaint little pamphlet, issued by the Huyett & Smith Mfg. Co., Detroit. Accompanying this was another neat circular, giving a list of some of their customers for Heaters and Dry Kilns, which contains the names of hundreds of well known firms throughout the country. Those of our readers wanting to know anything of hot blast apparatus for heating and drying should write them for circulars.

THE BOYD BRICK PRESS.—This line, so familiar to our readers, is very prettily printed in three colors on the front cover of a new catalogue being mailed by Chisholm, Boyd & White, Chicago. The illustrations are as fine as the engravers art can produce and includes not only cuts of their various presses, but also views of their new factory—both exterior and interior. It is an unusually handsome book.

MORRISON'S IMPROVED KILN is the subject of a little pamphlet issued by R. B. Morrison & Co., Rome, Ga. The book, the publisher says, is prepared with a view of enlightening those unacquainted with the Morrison Improved Kiln and its manner of operation. It also contains some valuable suggestions on the burning question, and a number of testimonials from well known brick manufacturers who have used the kiln with profitable results. Write for a copy.

EDITORIAL NOTES and CLIPPINGS.

I WOULD not care to be a king.
I envy not their state;
But I confess I'd like to be
A walking delegate.

—New York Herald.

Lexington, Tenn., wants a brickyard.

J. W. Cox is making brick at Emory, Texas.

Prof. Crosby will erect a brick plant near Greensboro, N. C.

Elizabethtown, Tenn., is to have a new brick manufactory.

John Dougherty & Son, Brewer, Me., are building a new brickyard.

Ruprecht's brickyards, in Luxemburg, Mo., were partly burned recently.

The Denver (Colo.) Terra Cotta Co. had a \$2,000 fire July 12th. Insured.

The Diebold Fire Brick Co. Canton, Mo. has been incorporated capital \$25,000.

The U. S. Brick Press Co., Chicago, has removed its office to room 1111, 79 Dearborn St.

Marlette, Mich., is thought to be an excellent point for the establishment of a brick plant.

Marietta, Ohio, is investigating brick pavements and will probably lay a few squares on trial.

The brickyard of A. W. Richart, near Otsego, Mich., was burned the 1st inst. It will be rebuilt at once.

Waldo E. Gilbert contemplates organizing a company to erect a new brick plant at Berlin, Conn.

John S. Hunnicutt, P. O. Box 496, Chattanooga, Tenn., is in the market for pottery machinery.

Gorman Bros. will put an artificial dryer in their brick plant at Hottelsville, near Bethlehem, Pa.

The King Brick Co. has been organized and will build brick works at Nester, N. J. Capital \$25,000.

The Henry Martin Brick Machine Co., Lancaster, Pa., recently shipped two car loads of machinery to Cuba.

John Foss's brickyard at Canton, Md., was damaged \$600 by fire July 19, which started in the kiln sheds. Insured.

There was a cave-in at the brick works of Budd Bros., at Camden, N. J., the 9th, which buried Wm. Broody, an em-

ploye. He was dug out from beneath the clay by his fellow workmen in time to save him from smothering, but he was severely injured.

The Howells Coal Co., have unearthed a valuable vein of clay near Justus, O. and will probably erect a brick plant there.

Those of our readers interested in the stiff clay process will find an important communication on page 174 of this magazine.

If you want anything you haven't got or have something you don't want, read or advertise in our "Wanted, For Sale, Etc.," columns.

The Frederick City Brick Works, at Frederick, Md., will be enlarged, owing to the continued and increasing demand for their paving brick.

The Taylor Pottery Works at Atwater, O., was burned July 25th. Loss, \$12,000. Little insurance; policies amounting to \$10,000, having expired a few days before.

The Atchison (Kan.) Vitrified Paving Brick Co. has been sued by Thomas Beattie, its former president, for \$26,000 for damages, etc., and \$487.50 on an account.

W. O. Myers of Canton, Ohio, owns a tract of clay that is very rich in alumina. It is easily accessible by rail, and Mr. Myers would be pleased to correspond with anyone desiring to purchase same.

The Clinton (Ia.) Vitrified Paving & Building Brick Co. are in the market for machinery, press, kilns, dryers, etc., for a brick plant of a capacity of not less than 150,000 per day, and will be pleased to receive catalogues, etc.

The Tube City Brick Co., McKeesport, Pa., has been incorporated. Capital \$25,000. Directors, John P. McIntyre, James S. Kuhn, David M. White, Homer C. Stewart, McKeesport; James A. Morrow, Allegheny City; A. E. Claney, Bellevue; J. F. Cockburn, Allegheny.

Many manufacturers are now arranging for various improvements in their works for the coming season. The putting in of new machinery of large capacity will leave them with small machines and appliances that are to all intents and purposes as good as new, which may be easily disposed of by a small "ad" in our "For Sale, Wanted, Etc.," columns.

[Continued on page 160a.]

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ANTHONY ITTNER,

MANUFACTURER OF

ST. LOUIS AND BELLEVILLE PRESSED AND ORNAMENTAL BRICK.

OFFICE ADDRESS:

ANTHONY ITTNER, Builders Exchange, Telephone Bldg., St. Louis, Mo.
St. Louis Works, California Avenue Belleville Works, L. & N. R. R. near
and Sidney Street. Belleville, Ill.

Fine Press Brick, 10,000,000	Total Yearly
Ornamental " 2,000,000	Capacity:
Common Press " 15,000,000	27,000,000.

Our Press Brick have sharp and well defined angles, and are free from the objectionable mark or streak, so frequently seen running lengthwise through the face of the other dry clay brick, and commonly called "granulation."

The color of our brick being a beautiful dark cherry red, equal to any manufactured in this country.

The Dies we use are a Patent of our own devising, in which the liners can be renewed at a trifling cost, hence we have no occasion to let the liners become so badly worn as to mar the corners and edges of the brick.

We also have a PATENT REVOLVING UPRIGHT STEEL BRUSH PULVERIZER, which leaves the clay loose and flaky, a condition so favorable for making a solid uniform homogeneous brick, which, under the trowel, can be cut into any shape without breaking.

Ours is the only DRY CLAY Brick Works in the United States that harvests and gathers the clay in its depth, thus securing a standard, uniform brick, year in and year out, continuously.

The results of the above advantages are accounted for and seen in the following certificate, which speaks for itself:

MESSRS. ITTNER BROS., St. Louis, Mo.

BOSTON, Feb. 15, 1889.

GENTLEMEN:—We have carved the brick panel you sent us and ship same to you this day. Although we have had a large experience in brick carving, we do not hesitate to pronounce your brick the best for carving purposes that we ever used.

Yours truly,

EVANS & TOMBS.

We keep large quantities of Press Brick in stock, and are prepared to fill large orders on short notice. We pack them carefully in straw, so that they can be shipped long distances without material damage.

BOOKS FOR BRICKMAKERS.

It is pretty generally conceded that wonderful progress is being made in the ancient and heretofore unprogressive art of brickmaking. Among the best evidences of this is the fact that the brick-making craft is no longer without a literature of its own. There are now some good practical books treating on the manipulation of clay—the making, drying and burning of brick. The list is not so large but that every brickmaker can afford to have them all. Get them and read them.

"BRICKMAKER'S MANUAL,"

Morrison and Reep, \$3.00

"BRICKMAKING AND BURNING,"

J. W. Crary, Sr., 2.50

"TABLE OF ANALYSES OF CLAYS,"

Alfred Crossley, 1.00

"DURABILITY OF BRICK PAVEMENTS,"

Prof. I. O. Baker, .25

Mailed, postage free, on receipt of price. All of them to one address for \$5.50. Address the publishers, T. A. RANDALL & Co., Indianapolis, Ind.

THE CLAY WORKER.

THE OFFICIAL ORGAN OF THE NATIONAL BRICK MANUFACTURERS' ASSOCIATION OF THE UNITED STATES OF AMERICA.

VOL. XVIII.

INDIANAPOLIS, IND., SEPTEMBER, 1892.

No. 3

Written for the Clay-Worker.

TILE ROOFS IN HILDERSHEIM.

THESE are of the old German tile roofs which are so frequently mentioned by people who have a love of the picturesque. The buildings in the foreground of this picture are those of the fifteenth and sixteenth centuries. The church in the background, with its stone roof on the towers was built early in the twelfth century. Certain parts of the main roof of this church are covered with tile though it is not probable these tile now in use date from that period, as such a covering was not in use in this part of the world at that time. Yet, it is known the tile coverings date well back in the world's history. Those of us who have read General Wallace's book, "Ben Hur," know that he makes authentic use of the tile covering in the early part of that story, and burned clay coverings are as old as any literature that we have.

These particu-

lar examples, these pictures of tile roofs, will have their effect in a missionary way, of giving to the public a good roof. A slate roof is not a good roof. Slate will not stand fire; it is one requiring constant attention in the way of repairs,

being as it is, effected by the severe changes of temperature and the general influence of time, and being very brittle and very light, it is otherwise readily effected by accident. A shingle roof we know is temporary; yet as to the insur-

ance value of a shingle roof, it may be said, however, that the Factory Mutual Insurance Company of New England prefer a shingle roof to a slate roof. They do not like either covering yet shingles have the preference. They say that a little sniff of fire exposes the sheathing and woodwork of a slate roof while it takes really more heat to disturb the shingles. This is the deliberate judgment of the best insurance organization in the world. They look at it strictly from the insurance standpoint.

There is an unaccountably strong prejudice favorable to slate roofs. People say that a brick house with a slate roof is one of the ideals of solidity. Such a house is the ideal home with many people. However, there can be no doubt



TILE ROOFS IN HILDERSHEIM, GERMANY.

but the masses of the people are ready and willing to take up with the tile roof we have a number of them in our city and it is known that they are scattered all over the country. Yet if one would wish to get a good tile roof put on his house to-day, it would cause him infinitely more trouble than to get slate or shingle.

While it is true that people are very ready to use tiles, and have used them to some considerable extent, they are not disposed to go to any great trouble on that account. People are too fond of doing things easily.

Tile roofs have been used on frame buildings to a considerable extent, and any architect, in regular practice, knows that he has but to suggest the idea of tile roofing to his clients to secure its adoption. The picturesque quality of tiles has been presented in literature to such an extent that people accept the idea of its beauty, and as no one questions the efficacy of the clay covering as a fire proof material, the conditions are certainly ripe for their introduction.

We are disposed to say that a great deal of the bad building which is done in this section of the world is so, not owing to the deliberate intention of the people, but rather on account of the ignorance of those who build for them. A great many build thoughtlessly. They go to an architect, and say, "I have placed myself in the hands of a specialist," and to a very large extent they abide by what he says. Now this architect may be a narrow man; he may be artistic, he may have good general ideas as to matters of general construction, still in business matters he may be deficient. He may not understand that in the course of thirty or forty years a large percentage of the cost of most structures is absorbed in repairs, and that this is absolutely wasted capital. It is money, which for the most part need not have been lost, excepting on account of the fact that the original plans and specifications of the work was improperly considered.

We cannot say that our people do not put enough money into their houses to build them well; that is not true. They put a great deal of useless money into wasteful details. For instance, in our own city, on good residence streets, there are frame houses with towers, turrets, and dormers piercing the air from many points; there are fantastic porches loaded down with jig-sawed rubbish; windows covered with ugly

hoods, cornices, and the general structure disturbed by homely, useless and expensive excrescences. Take off these ugly dormers or rather their wild details, remove the ugly towers and the temporary, coarse details of the porches and other features, and we will have a house of better character, more permanent, costing less money, and infinitely more satisfactory. Some of the new streets in our city are a perfect nightmare, made up of ugly frame houses, with their coarse, aggressive, temporary details, violently and inharmoniously colored. In the course of a few years all of this property will be a source of endless expense to the people who own it.

What has all this to do with tile roofs? Tile roofs are a step in the direction of permanency. One who does all that he can to secure the introduction of tile roofs, is helping to add to the permanency of the world's capital. There are tile roofs covering frame houses in this town which would outlive the history of a dozen such structures as those of which they are a part. We must do what we can for a better building. Tile roofs and brick houses are a long way in the direction of good work. By comparing good work and bad work, we ease the way to an advancement.

In speaking of the porches and dormers and other details of frame houses, or brick ones for that matter, we do not say to omit them, but we do say to omit the temporary, wastefully constructed features, to make them more simple, with better details, better material and altogether in a way to contribute to their permanency. Tiles make beautiful dormers. Dormers made entirely of tile are entirely possible. In the foregrounds of this picture is a dormer roof covered with tile, with the face of it as half timber, oak filled in with brick with the brick surfaces plastered. At the right hand edge of this picture is shown a little dormer made entirely of tile, coming down out of a steep roof. But the details and variations of these tile dormers and tile forms are almost as varied as the leaves on the trees.

LOUIS H. GIBSON.

GIVE the other fellow credit for knowing something, my sharp friend, before you try to succeed by bluff or by downright fraud. Work wins and truth lasts when both the gambler and his gains have gone to the dogs. The game may seem to be a winning one when

you begin it, but the public soon unmasks frauds, and Lincoln's famous saying, "You can fool all the people sometimes; you can fool some people all the time; but you cannot fool all the people all the time," should be a fundamental principle with advertisers. Put the impress of truth on your announcements. Do not allow them to have even the color of fraud. Tell the truth even against yourself, and, when the confidence of the public is once gained, beware how you trifle with it. It is hard to build up; easy to pull down.—*Fame.*

ONE SECRET OF FAILURE.

THE *Pottery Gazette* lately published an excellent article on "Untidiness and Ruin in Shops," in which it says: "Whether untidiness leads to ruin or that a manufacturer who is losing money has not the moral stamina to keep things in trim, thrifty shape is a hard matter to determine, but true it is that untidiness in the shop and factory and ruin are such close friends that they are ordinarily seen together, and the sight of one suggests the other." We have often seen workmen of rare ability, judged by their hustling manner, who would spend much time each day looking for some tool or other article in stock, stumbling over piles of stray castings left on the floors or piled under the counters when it ought to have had a place of its own, and be in that place. And when the article is found he never thinks of returning it to its proper place. In fact there will be no "proper place" for the various tools in such a factory, and the next call for this tool the workmen will be compelled to go on the same hunting expedition about the place.

But the greatest loss experienced by this deplorable and needless state of things is in the morale of the factory. Workmen compelled to work in a dingy, ill-kept and ill-lighted factory, will suffer loss of ambition, loss of self-respect and respect for their employers and his interests. If they are forced to work at disadvantage the stimulus to activity suffers a gradual decay, and no one will pretend to deny that this decadence on the part of the workmen is a direct money loss to the proprietor.

Tidy factories stimulate manliness and energy on the part of workmen, and right here may be found the profit on the whole year's business, or if neglected, the year's losses. There are plenty of establishments, East as well as West,

which, by a careful attention to these matters, could easily increase their net gains 10 per cent., and that per cent. would determine the difference between a profit and a loss.—*Ex.*

Written for the Clay-Worker.

PRACTICAL POINTS ABOUT PAVING BRICK.

Fifth Paper.

BY D. W. STOOKEY.

BURNING.



THE PROCESS of burning paving brick is very similar to, probably identical with, burning building brick during the earlier stages, and through the greater part of the time of burning. It is at the least that the

method is different, and with many clays, and in many kilns of brick, the course pursued by the burner during the latter part of the burning decides whether the brick will be suitable for building or paving. If they are intended for building, the burner may close when the heat is through the kiln, but if he is to make paving brick of them he must continue his fires after the heat is through the kiln, and increase the intensity of the heat until it reaches that degree necessary to vitrify the brick if they are so constituted that they will vitrify. If they are not he must heat them hot enough to fuse the less refractory parts of the clay and thus unite the whole into a homogeneous mass. After they are burned hard enough for building brick he must continue the firing and increase the heat until the brick are of the class known as hard burned eye brick or until they are vitrified.

The necessity of burning paving brick so hard makes the work more difficult and requires greater skill with some clays than is required in the burning of building brick. In burning paving brick the heat should reach the melting point of the less refractory parts of the clay without destroying the form of the brick. The ingredients must be fused, that is, united or blended together without being melted. In some clays the proportion of fusible parts of one kind is so large that when

the degree of heat is reached, which is necessary to unite the particles together by fusion, so much of the brick is softened that it is liable to lose its form by melting. Better results would be attained and less care would be necessary in burning if a limited amount of fire clay, or some clay that is more refractory than the one in use, be mixed with it. This would assist in retaining the form of the brick while fusion is taking place.

In burning building brick more latitude is admissible in the hardness to which they may be burned. Any that are hard enough to remain intact until laid in the wall may pass inspection if given certain sheltered positions while

there is no possible reason why the clay should be required to withstand the heat for a long time. It is the obtaining of the result that is essential and not the consuming of a long time in obtaining it.

Neither is it absolutely necessary that the clay should be able to withstand a very high heat for a long time. Some so-called tender clays would assume the conditions requisite for a good paving brick at a comparatively low temperature, while others more refractory would require a much higher degree of heat, and yet, in all probability, would make no better paving brick than the ones that take on the necessary conditions at a lower temperature.

Paving brick must be all hard burned, and there are no places in a brick pavement where soft brick can be worked in, as they can in buildings for backing and filling. This shows the desirability of having all in the kilns burned hard. This is impossible with kilns that are not constructed upon good plans or that are in a dilapidated and imperfect condition. An old saying expresses the idea that it requires a mechanic to do good work with poor tools, but that old saw originated before the days of burning paving brick.

No mechanic, however skillful he may be, or experienced, can burn a kiln of brick uniformly and hard unless they are set in a good kiln. A good kiln is one that has solid, tight walls and crown; that has furnaces of sufficient capacity to produce the necessary heat at the will of the burner, and that has its air passages arranged in such a manner that the draft and attendant heat



JOSEPH FAIRHALL, BRICK MANUFACTURER, GRAPE CREEK, ILL.

paving brick must all be hard burned.

The statement has often been made that a clay that will make a good paving brick must be able to withstand a high temperature for a long time without melting. The fallacy of this statement lies in the fact that what is required of the clay is that it shall contain the necessary ingredients to retain its form while heated in the kiln to a temperature high enough to change certain other ingredients in such a way as to transform the brick as a whole, into the condition required of a good paving brick. If this condition can be attained with any given clay in a short time,

will be uniformly distributed throughout the kiln. Any attempts that may be made to produce hard burned brick without kilns of good designs, and that are kept in proper repair, will be attended with a greater or less degree of failure and disappointment to those directly interested.

Of kilns as of clays and machines it may be said that many kinds are in use for the manufacture of paving brick and all are turning out good brick, but the per cent. of good paving brick that are produced by the various kinds doubtless varies greatly. It is very likely that some have such a large

amount of brick too soft for paving that the profit of the manufactory are greatly reduced by the use of poor kilns.

Down draft kilns seem to be best adapted to burning this class of clay goods as well as many others. Two points of advantage of down draft kilns are of so much importance that they generally hold the position of first place in the minds of the manufacturers of the heavier classes of clay goods. One of these advantages is the uniformity with which the heat may be distributed throughout the kiln, and the other is, because the ware that is heated most and that may become soft from the heat and liable to change its form under pressure is upon the top of the kiln and is subjected to but little pressure.

In up draft kilns the parts that are hottest are in the bottom and must sustain the weight of all above when the kiln is heated to the degree necessary to fuse the particles together and vitrify all that is vitrifiable. The pressure to which the lower brick are subjected by the superimposed brick will very likely cause many of them to stick or weld firmly together, and many will be badly distorted.

To the manufacturer of paving brick the subject of fuel for burning the kilns is one of interest, and to which much thought and speculation are given. Of the four kinds of fuel in use, wood, coal, oil and gas, it may be said that any of them will produce the necessary heat. The function of a fuel is to generate heat, and it probably matters but little in the end whether the brick have been burned by heat produced from one or another. Heat is heat, and nothing else; whether it is generated in one way or another; whether by mechanical, physical or chemical agencies,

Since the draft is from the furnaces through the ware in the kiln, and the gaseous products of combustion with all else carried by, the draft passes in contact with the ware to be burned it is probable that the color of the burned goods will be somewhat effected by the particular fuel used. The principles involved in producing a salt glaze teach that chemical action may take place upon the outside of the ware by the influence of some of the substances carried into the kiln by the draft, but this action is so slightly different for different fuels that it need not be considered by the manufacturer of paving brick.

There are local influences that bear

upon the circumstances of each particular manufacturer, and these must be taken into consideration in the selection of fuel suited to each case. It is common to see in print arguments and testimonials based upon experience in favor of this or that kind of fuel, and these are often valuable and worthy of consideration in the comparison of different fuels, but, as stated above, each one must select that kind best adapted to his peculiar circumstances. This stated in another way means that each one must select that fuel with which he can burn his kilns with the least expense.

It may be true that some are more easily handled than others, or that they will sustain a uniform heat with less attention; that they are more cleanly; they may have this or that argument in their favor, but the one idea to be constantly kept in mind is, which one will burn a given amount of brick satisfactorily with the least expense. Brick manufactories are operated as money-making establishments, and the money made is the difference between the expense and the income. The manager who adopts this or that kind of fuel for burning his kilns because it is the latest "fad," because it is more cleanly or more convenient, when he could burn his brick satisfactorily with less expense by using some other kind of fuel has lost sight of the object sought in the establishing and operation of the plant. If the kilns can be burned with coal-slack or cord-wood for less money than with natural gas the burner must be denied the luxury and convenience of using gas.

In considering the expense of burning, the cost of the necessary outfit must be taken into consideration. With cord-wood the outfit may consist of a pair of leather mittens and a long fire hoe, costing, all told, a dollar and a half.

With coal, the necessary apparatus may be a few rough boards, a shovel and an iron poker, with a wheel-barrow added in some cases. With natural gas, a system of pipes and "appurtenances there to" are required, and in order to burn crude oil successfully, an elaborate outfit consisting of tanks, pipes, pumps and burners, to which, in some instances, must be added a steam generating outfit, and in others, the steam generator with an engine and air compressing attachment.

Experiment may have demonstrated that a certain number of gallons of oil

are equal to a ton of coal in producing heat and that the cost of the oil is something less than that of the coal, and yet the argument may be in favor of the coal because of the necessary expense of the outfit to be used in order that the oil may be burned successfully.

It must be borne in mind that this matter will depend, in a great measure, upon the amount of fuel to be used by the plant. If the difference in the first cost is only slightly in favor of the oil it would not be profitable for a plant of small capacity to abandon the use of coal and substitute oil, but if the consumption is large it may be that the small difference in cost will, in the end, amount to more than the extra expense of the outfit for burning oil.

The idea of producing the most goods for the least money should be constantly kept in mind, and that fuel should be used which will burn the kilns and produce satisfactory brick for the least money. Just so soon as the manager of a manufactory begins to introduce plans and systems because of their convenience, style, or appearance, while they incur additional expense over others that produce as good goods, just so soon he ceases to obtain the best results and the greatest possible dividends for the stockholders or profits for the individual proprietor, as the case may be.

ANNEALING.

Toughness is one of the essential characteristics of a good paving brick. It rests very largely with the burner whether or not the brick from his kilns are tough or brittle. True the proper kind of clay must be used for it is not to be asked of the burner that he will produce good tough brick unless the brick given him to be burned are made of clay selected, because it contained the elements necessary to make the required brick if it be properly handled. Yet so much does proper management of the kiln influence the toughness of the brick that the success of the enterprise rests upon the skill of the burner in annealing the brick and thus giving them the necessary toughness. The best of clay may be selected; the most improved machinery employed; the best methods of management adopted, the brick may be carefully dried and go into the kiln without a crack or check, and yet improper management of the kiln at the time of closing may make the brick rotten, dead, shaky, checked, cracked and wholly unfit for the purpose for which they were intended.

When the kiln has been properly burned and the burner pronounces it finished the process of annealing begins.

The one principle involved or end to be attained is slow cooling.

Every observing burner has noticed that pieces taken from the kiln while red hot and cooled rapidly in the air or in water present a cracked and crystallized appearance upon being fractured, and that they are easily broken and are devoid of the metallic ring that is so desirable. Annealing is a process that is arranged for by the last acts of the burner before leaving the kiln. It is in no way performed during the firing of the kiln, the raising of the heat nor the holding of the temperature while the heat is being driven through the kiln, but is strictly an act of cooling.

The heating of the kiln is essential, but the annealing and consequent toughness of the brick is wholly dependent upon the way in which the cooling is conducted. If the fiber and cohesion of the clay have been injured while watersmoking, it is not to be hoped nor expected that the burner will be able to produce a kiln of brick that will possess the necessary strength and toughness.

When the burning is finished and the kiln pronounced done, the fires should be allowed to burn low without materially lowering the temperature of the kiln. This may be done by partially checking the draft or by closing the furnace doors, if doors are used, more closely than during burning. If furnace doors are not used the openings, of whatever kind they may be, through which the fuel is applied and the air admitted to the fires may be partially closed. This reduction of the fires before closing is necessary, because if an amount of unconsumed fuel be left in the furnaces when the kiln is closed the heat from this fuel will likely overburn those parts of the kiln nearest the fires when the draft is stopped and no longer carries the excess of heat from the furnaces. After the fuel has been well burned out the furnaces should be hermetically sealed with a plaster of clay. Every crack and hole that might admit air should be filled.

The draft should now be effectually checked so that the heat may be held

within the kiln. All should be left in this condition for at least twenty-four hours. During this time quite an amount of heat will escape from the kiln, and the cooling, although retarded as much as possible, is as rapid as is for the best interests of the brick. At the expiration of about twenty-four hours the kiln may be opened very gradually and the cooling somewhat hastened.

It is well known that the particles of a body change their positions somewhat during the expansion attendant upon heating. If the body is slowly cooled the particles may return to their former position of stability, but if cooled rapidly, they are arrested in the posi-

a body that has been rapidly cooled and the brittleness attending may be made clearer to the mind by considering the conditions that exist in a bow that is bent or a spring that is strained. When the strain is carried to the limit it is observed that just before breaking the spring or bow reaches a hard, stiff condition and seems to stop bending and, as it were, tries to resist further flexure, as if it knew that to go farther would be fatal.

Now this is the condition of the particles of the brittle body that has been cooled rapidly. If the cooling process has been too sudden, the body cracks, as is seen in the tile or brick that has been taken from the fire and cooled quickly in the air or in water. When the bow has reached the limit, it is in a condition that it may be broken by forcing it a little farther, it is in the brittle state. Whereas if it is not bent at all, but is in its normal position, it may be said to be tough and may be bent considerably in any direction without breaking. In cooling an object slowly the particles are allowed to assume their normal positions and are at ease, and the object may be said to be tough. If cooled rapidly the particles are arrested in a strained condition and it may break if forced a little farther, that is, it is brittle.



H. C. WEBSTER, PRESIDENT AND MANAGER JARDEN BRICK CO., PHILADELPHIA, PA.

tions that are more or less strained.

There is a constant tendency while in this strained state to change position, just as a strained spring or bow tries to return to its original position. A blow or shock tends to shatter the piece by breaking the tie at some point and thus destroying the equilibrium. Glass manufacturers recognize this, and by annealing, which consists in re-heating and cooling slowly, allow the particles to assume positions less strained and more stable, and consequently the glass is more tough and not so easily broken.

This strained state of the particles of

arrangement of building to cover a hot floor dryer, and mode of operating dryer.

For a floor 40x150 ft. the building must be 40 feet wide by 175 feet in length to cover furnaces and fuel pit. The following plan of building and roof, answers the purpose well: A row of posts 4x6, 7 feet long, on each side—a post for each 8 feet longitudinally; 10 feet from these two parallel rows of posts 4x6, 14 feet long, making the two rows of 14 ft. posts, 20 feet apart; these support the center or main roof; upon these a 4x6 plate, which supports rafters of main roof. The rafters should project over plate at least two feet. Two feet

Written for the Clay-Worker.

HINTS ON BRICKMAKING.

BY R. BRICK.

No. 67.

DRYING FLOORS.

IN the June number of the CLAY-WORKER, Mr. Waplington requests the writer to describe

below this plate spike a 2x8 piece on edge against outside of post. It should be let into the posts one inch. This supports upper end of side shed rafters—the lower ends resting on 4x6 plate on side, or short posts; these should also project at least two feet beyond plates. Upon these rafters nail sheathing for shingles. The two feet space between upper and lower roof gives necessary ventilation; in mild climates this can remain open at all times; where winters are severe it would be necessary to have shutters that could be partially closed in cold weather. The sides should have sliding windows for light and ventilation, with doors each 25 feet, either sliding doors or to swing upward. In summer the windows and doors should all be open, the air being warm and dry assists the artificial drying, but in damp and cold weather they should be kept closed as outside air then retards the drying of the bricks where there is hard freezing. It is best to build a wall of dried bricks against inside of the building. This should be the thickness of a header and stretcher on edge—the header and stretcher changing places in each alternate course. This wall is built up to plate, and is practically frost proof. The wall is built solid except windows enough for light and leaving openings for the doors that must be used. In spring this wall is wheeled into the kiln same as other bricks. The posts must rest on brick pillars and should be twelve inches above floor level to be safe from fire. The building must be braced both ways to be strong. 2x6 rafters are sufficient for a building of this width. For a floor 60 or 70 feet wide all frame lumber should be heavier. The furnaces are kept up to a bright cherry red heat or about 1800° F. The most economical mode is to fire twelve hours then bank the fires and lower dampers, leaving just enough draft to carry smoke to the stacks balance of the day. It is a good plan to have the firing done at night. Your fireman can also be night watchman and guard the works from fire. Coal screenings is preferable for fuel, unless oil or natural gas can be used. The furnaces must be kept clear of cinders same as furnace under boiler. Experience soon teaches the amount of firing necessary to dry the product. The firing must also be regulated to suit the nature of clay to be dried; some will bear to be dried in ten hours and some in twenty-four hours. Soft mud bricks can only be dried on flat,

while stiff clay brick can be dried on edge or on end. They will break more drying on edge than on end. On edge the brick is in contact with the hot floor its entire length; this side shrinks and the top side parts while on end only one half as much as on the floor, and the bricks stand the strain of unequal shrinkage without breaking. A soft mud brick dries first on top and last on the bottom side next to the hot floor. This caused a well known contributor to err in his conclusions. He said the moisture was absorbed by the hot floor, passed into the flue and was carried out through the smoke stack. While it is true that the floor absorbs a little moisture it is a mistake about it passing down into the fire flue; it rises or is taken up by the atmosphere and passes out through the ventilators of the building. Soft mud bricks are coated on every side except the bottom with sand. This coating will not allow the passage of moisture through it. Hence it must pass out through the wire or porous side next the floor. Place a stiff mud brick on the hot floor on its side or edge and it becomes dry *first next the hot floor and last on top*. Hence it must be the coat of sand that causes this difference. If the moisture passes through the floor and out through flues and stack in drying soft mud brick, why should it not pass out in the same manner in drying stiff clay bricks? If there is any vapor passing from the smoke stack on a cold day it is easily distinguished, for contact with cold air condenses it into fog.

"William," in August number of CLAY-WORKER, asks the writer, "If the flue dryer could be partially fitted with racks and successfully used as a combination of hot floor and drying shed, and if the radiation from a floor, (made thin—say six inches at furnaces to one inch at stacks) would be sufficient to dry ware such as roofing tile on pallets.

First, the writer wishes to gratefully acknowledge the high compliment paid by "William" to "Hints on Brickmaking," which is much greater than they merit.

I can see no reason why a hot floor in combination with racks should not materially accelerate the drying of ware. Hot air will absorb more moisture than cold. The floor would supply dry hot air, which would pass upward through the ware in racks. It would also protect the ware from frost, and force the drying of same during rainy weather. As to thickness of floor over flues, six

inches at furnaces and one inch at stacks. This would answer if a floor of this thickness above flues could be made air tight. The flues ought to be covered with bricks. These are two and a half inches thick. An inch of Portland cement on these bricks would make an air tight cover. I would recommend a floor of standard thickness, say twelve inches at furnaces, or, ten, at least, and six inches at stacks. After this floor is once heated it requires no more fuel to keep it hot than would a thin one. The degree of heat in either case can be perfectly controlled and regulated by the firing of the furnaces. The sides of this shed should be same as regular dryer. When weather is favorable admit air at the sides; when it is cold or damp close up the sides and keep up the temperature inside to at least 100 degrees. Such a floor could be used as a direct dryer by putting the ware on the floor, or, as an aid to the drying in the racks.

Written for the Clay-Worker.

CONTINUOUS KILNS.

Second Paper.

IT soon became an indisputable fact in Europe, of which Hoffman was not aware himself, that brick burnt in Ringovens, built after Hoffmans principle, in comparison with those made of the same clay, in the same locality and by the same process, having the same outward appearance and color, showed a considerable higher resisting strength to the square inch than those burned in field kilns or old German kilns, which latter consisted of an arched kiln with very heavy walls and filling on top; fired from the outside through furnaces like our American clamps. Besides that a saving of 60 and afterwards 80 per cent. of fuel was observed and the labor of firing made very much easier in regard to the expenditure of physical strength as well as to the easy control of the fire.

Now arises the question, "Why are the brick burnt in a continuous kiln, built after Hoffman's principle, in proportion stronger than others? I believe the reason to be the very gradual water-smoking, heating up and finally finishing of the brick is one cause, and the other, the cooling process, which commences, as everyone can observe, during the last hours of firing, and continues very slowly but evenly till the taking out laborer touches the brick. White hot

brick are, so to say, cooled by red hot air; red hot brick by hot air; hot brick by warm air, etc., and at no time and in no place does the least extra amount of cold air pass into the kiln and between the heated brick. Furthermore, the fire is distributed to the greatest perfection imaginable among the contents to be burned.

In the next part of this article I will have to deal with some very serious objections to the above mentioned advantages of the continuous kiln, mostly caused by a very bad reputation of the same in this country, and not waiting for the arising of those objections I will try to answer them.

First, we heard, and some of us have seen, so very much of the uneven burn of the brick in continuous kilns, so that we came to the conclusion the clamp kiln produces a more even burn. Now I must say, if we visit the different brickyards on our own account, without being guided and watched, we will find some yards with excellent burns in the old clamp kilns or other noncontinuous patent kilns; but we will find as well very many poor burns in those kilns; we will also find everywhere an immense loss in brick, as arch brick, salmon and bats. That shows a possibility of good burns, but it is no rule. The burning in clamp kilns is an art, which has been exercised since the ruling of the Pharaoh's in Egypt; nevertheless it is a difficult thing to master to-day. On the other hand, if we visit the first built Hoffman kilns, we will find on top and outside of each compartment the same proportion soft (very seldom salmon) brick as in the old style clamp (or field) kilns, which is due to the location of the flue in the inner wall of the compartment, but if the kiln is in good hands, we will find no brickbats, and nothing that resembles an arch brick; but the saving of the 80 per cent. of fuel cannot be denied. Hoffman himself saw this very well and tried to overcome the difficulty of some soft brick by different means, i. e., leading the surplus heat of the cooling brick through an extra channel to the outside and top brick in the newly set compartments; by using small stoves attached to the doors of the kiln for water smoking that part

of the contents, which stands close to the doors and on the outer wall. All those remedies were only a limited help. By and by other builders and brickmakers tried with more or less success to improve on the Hoffman kiln, and the same stands under different names to-day upon a height of completion, which is surprising, and the writer of this article has seen and knows of continuous kilns in this country, which turn out permanently *every* brick that was set in as a good green brick, burned perfectly, without bats, arch brick or pale bricks, and at the same time saving 80 per cent. of fuel in comparison with the old style of clamp kilns.

Second, if we take for granted what is



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said above, why does the continuous kiln not come more in use in this country? "Something must be wrong about it."

The main objection to the adoption of a continuous kiln is the first outlay of an apparently large amount of money for the erection of a kiln. A continuous kiln of a yearly capacity of nine to ten million of brick, if to be built substantially and well, will require (including roof) an expenditure of at least 10,000 dollars, provided all brick used and labor furnished is figured at market price. A smaller kiln costs comparatively more. But this is not all; to run a kiln summer and winter, considerable money has to be spent, especially in

severe climates, for the erection of drying sheds, storage sheds, machinery, etc., etc., because a continuous kiln working without interruption requires every day in the year, a certain amount of brick to be put in. To avoid misunderstanding, I must add that there is no necessity to work on Sundays, except for one fireman, the necessary 7th compartment to be burnt on Sundays can be filled, and is, in well arranged brick-works, during the week days. In some parts of England the kiln is closed airtight and no firing at all done on Sundays. But the necessary number of brick has to be made and stored away, or the kiln has to be stopped in winter time, and the capital lies idle for six months or more. Furthermore, it is necessary to procure a larger tract of land, with a deposit of good clay for such brick-works, because the kiln can not be moved, but is expected to work on the same place for a half century or more. On the other hand, the expenditure of a large capital is only imaginary. There are a good many other factories which require ten times more capital than a continuous kiln brickyard, and do not pay half the dividend. It is only a matter of close and careful figuring, which will show that a yard with continuous kilns under the same conditions and in the same locality with a yard with the clamp kilns always will pay better and is the safer investment.

In very many cases these kilns are built in this country without figuring said extras, and when the kiln is fairly built, no capital is left to provide for all the other necessities, and every body knows that the brick business requires considerable working capital after everything is completed and well started. In most parts of the country the brick-maker has to give long credit to the purchaser of his goods, and a large percentage of the profits is lost in that way, and to borrow working capital at 10 per cent or more if it could be had, decreases the profits very much.

[TO BE CONTINUED.]

THE repetition of advertising is one of its main forces. The Bible tells us of a man who was heard and supplied "because of his importunity." The boy crying the evening papers or the boot-

black repeating his "Shine," "Shine, sir," often calls us out of our "brown study" to a realization of our ordinary needs.—*Fame.*

Written for the Clay-Worker.

BONDS IN BRICK WORK.

WE hear a great deal about bonds in brick work. The different kinds are mentioned by name: The English bond; Flemish bond; Herringbone bond, and others. Yet many of us are only familiar or know the bond that is in common use. With us it is either a blind bond every six or seven courses or a header bond, or a header and stretcher bond coming every six or seven courses.

The English bond is a header for every other course, with stretcher intermediate. Opposite the header course or rather back of it in a wall thicker than an eight-inch wall, is the stretcher course. So, in point of fact there is a header bond and a stretcher bond for every course in a wall of this kind. Fig. 1 is the elevation of an English, bond wall. Fig. 2 is the plan of the

header, brings about the proper spacing so that all header joints are one over the other, and all stretcher joints one over the other thus causing them to line and at the same time to bring about a perfect bond. There is a great deal of detail in connection with the laying of the English bond, for different kinds of walls and under different circumstances. By bearing in mind the use of the closer and the general princi-



Fig. 2



Fig. 4



Fig. 3

lower course in this wall. Fig. 3 is the plan of the course next above it, and each alternate course, and so on. Fig. 4 is a cross section of the wall as represented in Fig. 1. This shows how the header and stretcher bonds alternate on each side of the wall. First, there is a series of stretchers of one course. For instance, the bottom course on the outside, and then a series of headers on the same course on the inside of the wall. Next above this the order is reversed.

As the length of the brick is, say twice its width, it is necessary to use a closer, in order to produce a bond at all. If no closers were so in use, the joints would necessarily come one over the other and there would be no bond. The closer being one-half the width of a

ples of the bond, no one who will give the matter any thought under any circumstances, will vary greatly from the proper plan. Fig. 5 is the view of the end of a two-brick wall. Figs 6 and 7 are plans showing the arrangement of the bond one over the other. The dotted lines

Fig. 5



Fig. 6

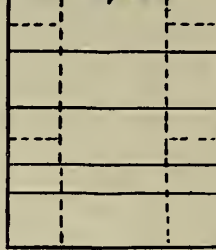


Fig. 7

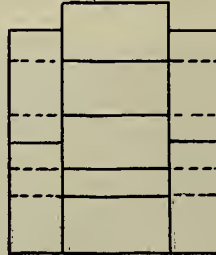


Fig. 8



Fig. 9

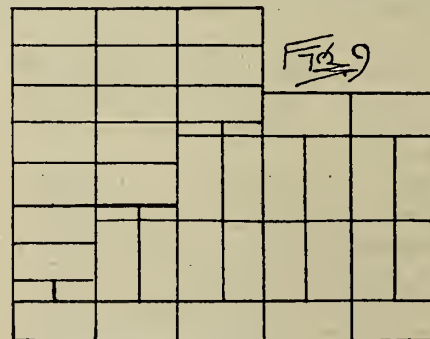


Fig. 10

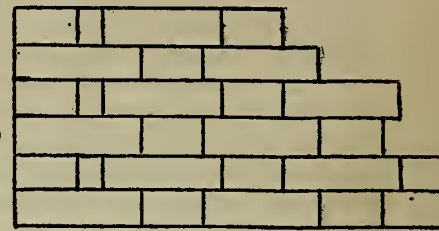


Fig. 11



Fig. 12



indicate the joints of the next lower on upper course. Fig's 8 and 9 show the two successive courses of a three-brick wall and the manner of turning a corner.

Another bond familiar to us through photographs and representations which have been made of Foreign work through the CLAY-WORKER, is the Flemish bond. This wall is made up entirely of headers and stretchers for each course. Fig. 10 is the elevation of a Flemish bond wall, and Fig's 11 and 12 show the plans when it is laid 8 inches in thickness. The position of the closer is properly shown. Fig's 13 and 14 show plan of Flemish bond wall. Generally, the alternate courses are filled in with half brick. Fig's 15 and 16 represent plans of bond where the Flemish is used on the outside and

Fig. 13



Fig. 14



Old English on the inside. Another plan of laying this bond brings a space in the wall the width of a closer, and half the length of the brick which is filled with a piece or with mortar, and in some instances left open. This, however, is not desirable.

Where great strength and solidity is required, there can be no doubt that the English bond makes the best and the strongest wall. The name of English bond is not significant; it is very commonly used in Holland and Germany, as well as other sections of the Continent.

The plans which are here given indicate clearly enough, just what is meant

Fig 15

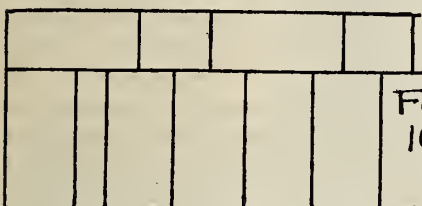
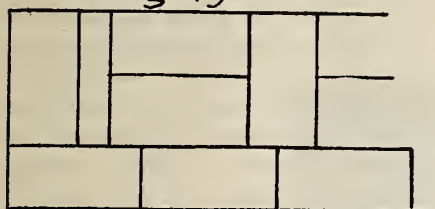


Fig 16

by the terms English and Flemish bond, and those who take enough interest in the matter to study it, at all, will be able to work out all of the details which might be illustrated and show the various combinations and uses, and the varying arrangements which would necessarily be brought up under changed conditions.

Written for the Clay-Worker

THE TRIALS OF A BRICKMAKER.

No. 3.

DRAWING KNOWLEDGE FROM A DEEP WELL WITH A SHORT ROPE.

SOME of these days we will open a new kiln of brick and find that we have "struck it rich."

The manganese which we mixed with the clay will, for a wonder, be found to have been of the right proportion to produce the color we were after, and our fortune will be in sight. If the "bird in the hand" materializes, we will sit down at our leisure and write a book upon what we know about brickmaking. Probably we will have to carry it into the second volume, for it often happens that the length of a man's literary production creates more of an impression than the power of its matter.

For fear that we may never get a chance to tell in that book about the

many things we do not know about brickmaking, we will use the columns of the CLAY-WORKER to speak of some of the difficulties we have met in gaining what little knowledge of the business we have.

In searching for a knowledge of the brick business we have never had any difficulty in finding volumes of advice, but the trouble has been to reach the same results when following a prescribed rule, as the advisors claimed they had. It has always turned out too much like following the route as pointed out by the four-corner country guide board, when it had become loose and the wind had swung the arm which read "To Jerusalem," pointing over the road that led to Jerico. We have come to the conclusion that in the brickmaking race, it should be one of go-as-you-please, and if you lack the natural sense to go aright, you will be side-tracked in spite of all the book learning in christendom.

Could a school for brickmaking ever graduate a pupil, fitted to at once successfully operate a brickmaking plant? —We doubt it.

Twice two makes four every time in mathematics, but just the same number of tons of coal will not burn every kiln (containing the same number of brick,) alike by a long shot.

Out in Missouri we used to back a dump cart up to a twenty-foot bank of clay, and if you shoveled it full, all from the top, or all from the bottom, it was already mixed with the proper proportion of sand. A brick made from any part of the bank would not shrink one thirty-sixth. In Rhode Island our unmixed clays will shrink one-fifth.

Our first effort in the brick business was a story on the same line as that of "experience against capital." It differed to the extent of being a magnificently fine clay bed against capital. We were totally ignorant of the depth of the well from which we were to draw knowledge of the business, and our own rope for getting at the water of life in that line, had never been tried. We therefore took some of the clay and traveled a number of hundred miles, to one said to be an expert in testing clays. We have never had any occasion to doubt in the least, his ability to fully bring out all the good of that clay. His chemical analysis was exhaustive, and the results extremely encouraging.

After eating about enough of it to make a brick, he claimed it good enough for table use. Although he tasted and ate enough of the clay to satisfy himself, (and us), he reserved enough, as he said, to make a final test, and which was to take it to a machine man and have a brick made of it. In due time the brick was made, burned, and delivered to us. To say that it was a beauty of a brick would not fully describe its perfectness. It took us by storm, and that clay bed in our eyes

was a banana. We thought no other brick was like it, and, in fact, we afterwards made millions which SHOULD have come from the same bed, but we never saw a brick like it again. In that case we were trying to draw knowledge from a deep well by another fellow's rope. It turned out long enough to bring up what was wanted when he had hold of it, but mighty short when in our hands.

Do you ask whether the trouble rests with the clay or the manufacturer? We answer, both. An unskilled pilot, however, in a sound boat might safely drift across the Atlantic, but where would he be in a leaky one? Is there then no way in which one can have a clay tested so that he can be certain of its adaptability to the purpose of brick-making? Oh yes; learn first how to make brick and then test it yourself. Do you ask how and where you can be taught? Well, we will tell you: Do just as you would if you were going to enter the banking or dry goods business. Apprentice yourself out for one year at least, and if you do not know anything about the business at the end of that time, you had better leave it for some other fellow that is better adapted to it.

In this way you will use the other fellow's rope in the other fellow's well, and if you do not succeed in drawing up therefrom any great knowledge of the business, you may, at least, save yourself from emptying therein the contents of your pockets.

Perhaps, if some one had given us the above advice before our later experience, we should have laughed at him, as the uninitiated brickmaker will at this. Ah well; sail in. "All things come to them that wait." Even common sense to the fool brickmaker.

We made a few remarks in our last article about the trials of a brickmaker in securing a good burner. We wish again to refer to the same subject for a moment, because it is one of the deep wells of the business. Around that well there is no curb, and into its depths many a blind brickmaker has vanished forever. No; in this case, a well will not describe its characteristics, but it is a Niagara.

Before you realized that it could be possible, a bad fireman had burned up your coal to no purpose, and stuck your resources, as well as your brick, where even dynamite could not blow them out of "hock." With your rudder gone and your brain pilot rattled, you plunge into the deepest well of experience mortal ever descended, and from which ten to one if ever any rope is found long enough to draw you out. Nothing, however, like keeping up good courage. Let us remember:—

"There's a land that is fairer than day,"
Where the brickmaker never shall weep,
For the burner of bricks over there
Will be kept by the D—l from sleep.

By faith we can see in that well,
And the rope to the bottom will reach;
While each brickmaker tells all he knows
In a tongue of most silvery speech.

J. A. S.

WANDERINGS WESTWARD.



BOARDING a sleeper on the 7:40 train, we are soon comfortably stowed away and our train rolls out of the 6th Street Station, rapidly leaving behind us Washington, the city of asphalt pavements (which, by the way, we hope to see replaced some day with vitrified brick). An hour's ride brings us to Baltimore and soon after midnight we reach Harrisburg, the capital city of the Keystone State. Owing to various unavoidable causes the train is twenty minutes behind time as we leave for Pittsburgh, but though our journey across the State and over the mountains is retarded not a little by heavy grades encountered, such good time is made that we reach the smoky city promptly as per schedule. A twenty-five minute stop and we are again westward bound, and five hours later sees us safe and sound in Union Depot, Cleveland.

The cable cars come close to the depot, and we are speedily transferred to the business part of the city, and free to engage in sight-seeing, for which this beautiful city on the lake affords abundant opportunity.

Euclid Avenue, the finest residence street in the world, Wade Park, Lake View Cemetery with the celebrated Garfield Monument, the Viaduct, the Arcade and other scenes of interest come in for their full share of attention and not only enhance the pleasures of the day but also fully prepare us for enjoying to the fullest extent one of the Hollenden justly celebrated six o'clock dinners. The hotel accommodations, by the way, are most excellent, the Hollenden being reputed to be the finest hostelry between New York and Chicago.

Cleveland is essentially a manufactur-

ing city, and the huge volumes of smoke that may be seen rising any day would indicate a rivalry to Pittsburgh, in this respect at least. The city is winning considerable notoriety in certain circles (at the present time) by the achievements of her local base ball team, but we will not dilate further on this theme, but leave it to some of our "enthusiasts" to explain why Washington or some other Eastern team is not ahead.

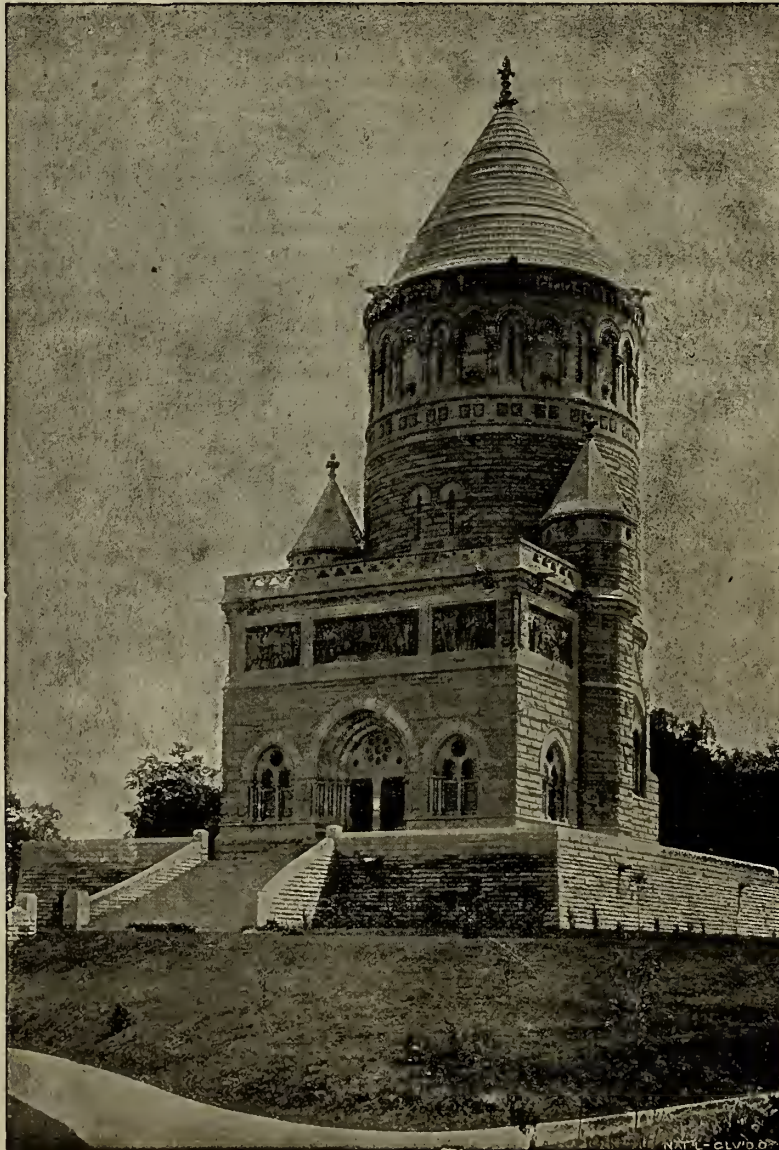
Thursday evening we had the unexpected pleasure, of viewing the wheelman's lantern parade, one of the features

Last Days of Pompeii," ending with a mammoth and remarkable display of fire works. Thoroughly tired out, we seek our downy couch, but is it any wonder that our dreams are of pyrotechnic style, or that blazing comets and fiery bodies of lesser magnitude are in order as we journey through the land of Nod?

But, our trip was to combine business with pleasure, so early the following morning we wend our way again to the Union Depot, taking the Lake Shore fast mail train which brings us through

a country of beautiful farms and loaded vineyards, landing us at the end of a forty minutes ride at Willoughby, the home of the Penfield Brick and Clayworking Machinery, well known to the readers of this journal. Reaching the works of this firm, which are but a minute's walk from the station, we are cordially greeted by the members of the firm and escorted through the various departments, which are decidedly of interest, and of size and capacity far exceeding our expectations. The west end of the works, 210 feet in length, adjoins the Chagrin River. The north side of the works is 200 feet long, and beyond this extends a lumber storing shed about 100 feet long, beyond which are a machinery storage platform and lumber piles extending probably 125 feet farther. The office buildings occupy the front, northeast corner, being two stories high, equipped with fire proof vaults and all modern conveniences, including long distance telephones, and private wires from the Postal and Western Union Companies' lines.

The machine shop proper faces both the river and road fronts, and consists of two rooms each 80x40 feet, and an adjoining room 55x42 feet. This department is fully equipped with all styles of metal working machinery and the busy hum of rapidly whirling wheels indicate,



GARFIELD MONUMENT, IN LAKE VIEW CEMETERY, CLEVELAND, OHIO.

of the three days meet. The wheels, adorned with Chinese lanterns of various sizes convey an impression rather difficult to fittingly portray in words but withal very striking and picturesque. We then appropriately close a day of sight-seeing by attending the spectacular entertainment, "The

that everything is in full operation. We particularly notice two mammoth planers, especially adapted for handling the mammoth castings used in their largest sized clayworking machines.

Adjoining the machinists' department is the clay testing department and storage room, 55x42 feet. In this department we notice a platform freight elevator for conveying heavy loads to and from the second story, which is devoted to the wood working and pattern making departments.

Back of the offices, on the ground floor, is the storage room for steel castings, which are used plentifully in the construction of the Penfield machinery. Back of this room extend the foundries, fronting the east, and covering a space of 125x65 feet. This department is equipped with two cupolas and the necessary blowers, cranes, tumbling barrels, etc. The rear portion of the foundry building is two story, provided with winding drum and

against fire. If necessary, sufficient pressure can be secured to throw a stream of water over the top of the works, and the pipe line connected direct with the steam pump, drawing its supply of water direct from the river.

The superintendent's office and draughting department is at the front, northwest corner of the works, partially overhanging the river.

The works are heated in the winter

by steam, and are lighted by artificial gas.

During our stay we had opportunity of observing the operation of one of the Penfield No. 15 Auger Brick Machines, with Automatic Sander, Automatic Cutter and Separator. We were

We are informed the machinery is running at a like rate of speed in a leading Chicago yard.



PENFIELD BRICK MACHINE WORKS.
(Viewed from the Southwest.)

A feature of interest noted is that the original and older buildings were constructed of regular brick, while in the later additions 4x8x12-inch hollow blocks have been used with good effect. Here is a suggestion for enterprising brickmakers. These large hollow blocks can be readily sold at the same price as would be secured for the number of common brick required to fill the same space, while the users of the blocks find great saving both in cost of laying the blocks and the amount of mortar required.

No objection being raised to our "pressing the button" of our Kodak, we are consequently able to present three views of the Penfield works, giving somewhat of an idea as to their location and arrangement.

After visiting the extensive brick and



PENFIELD BRICK MACHINE WORKS.
(Viewed from the Northeast.)

tramway for conveying the iron pigs and coke, to the feeding openings in the cupolas.

To the east of the foundry is a two story, fire proof building, size 40x50 feet, and used for the storage of patterns.

Connecting the foundries and machine shops is the erecting room, 100x45 feet. This room is extra high with skylight roof and provided with a variety of traveling cranes, drill presses, etc.

Back of the erecting room is a long storage shed for castings, and still further to the rear is a machinery storage building, about 130 feet long, with oil room adjoining. The saw mill is 50x15 feet, the boiler room 40x40 feet, and the engine room 26x15 feet. The engine is a new 125 h. p. Corliss, and a water wheel furnishes additional power if required. Adjacent to the engine room is a water tower 60 ft. high, connecting pipes and hose being laid to different portions of the works for protection

especially pleased with the fact that after the clay was fed into the machine no further handling was necessary until the bricks, automatically sanded, cut and separated were delivered at the end of the off bearing belt, ready to be wheeled away. The machinery works like a charm, and we noticed the cutter cutting and separating them at the rate of from 180 to 210 per minute without a hitch or skip of any kind.



PENFIELD BRICK MACHINE WORKS.
(Viewed from the Northwest.)

tile factory owned by the same firm and equipped with the latest machinery, artificial dryers and down draft kilns,

we spent the balance of the day by a drive to Mentor, the home of the family of the lamented Garfield, thence to Kirtland of Mormon Temple fame, returning via Waite Hill with its extensive fruit orchards and vineyards.

Returning to Cleveland we took the Detroit Boat to Put-In-Bay, noted in connection with Perry's victory, which is substantially called to mind by the new mammoth Hotel Victory, so named in honor of the famous lake battle in the war of 1812. The city of Toledo conveyed us via water to Toledo, and after the transaction of further business, we reluctantly, commenced our return trip via Columbus and Pittsburg safely landing at our journey's end.

Thus endeth our feeble attempt at chronicling a thoroughly enjoyable and withal profitable trip. Its memories still dwell fondly with us, and we live in hopes that it may be repeated at some not-too-distant date.

A. B. RICKMAKER.

P. S.—Since penning the foregoing, my attention has been called to the report that Messrs Penfield & Son's works were totally destroyed by fire on July 28th. This report is certainly erroneous and false, as the writer's visit was made some weeks after the above named date, and the works were still in existence and operation. A member of the firm told the writer that the only foundation for the report was a small, two-hundred-dollar blaze in an office room, the slight conflagration being caused by too great a superabundance of unchained electricity entering the office upon one of the telegraph wires, during a severe thunder storm. The fire was promptly "squelched," and the damage readily repaired without in any way interfering with the operation of the plant.

A. B. R.

ADVERTISING.

An advertiser, who is quite a success in his line, says a great deal of money is lost in spasmodic advertising. It takes a great deal more capital to get returns from advertising after the advertisers have allowed his advertisement to be withdrawn for a time than if he had allowed it to run continuously. Too many advertisers break up their advertising in small lots and advertise indiscriminately. Their returns are not commensurate to the money expended. Advertisements should be frequently changed and adequate space to give a proper exposition of what the adver-

tiser has to offer should be purchased. Small, crowded advertisements are usually ineffective, and in all cases it pays to place advertising with the mediums which go directly to the purchasing class.—*Inland Printer.*

Written for the Clay-Worker.

CHEMISTRY FOR CLAYWORKERS.

Paper No. 5.

I THINK I need say but little more about the terminals *ide* and *ate* except to point out the immense advantages of systematic nomenclature, or naming, over anything arbitrary or fanciful; let us take for example one or two of the substances mentioned in my last, say, "Smelling salts," "Epsom salts," and "Glauber's salts." Now this last substance is simply named after a man who first made it, Dr. Glauber; the next is named after a town in England where there are mineral springs containing it in solution; Glauber's salt might with equal propriety be called Cheltenham salts, for there are mineral springs at Cheltenham bearing this salt in solution. Smelling salts were so named because, used a great deal formerly for filling perfume bottles, but its purpose was chiefly to allay the head-ache, and not so much as a perfume. Some of the fanciful names actually mislead as to the composition of the substance named, for example, "sugar of lead," contains no sugar, but as usually sold it closely resembles loaf-sugar, and like it, is very sweet, yet, like the other salts of lead it is very *poisonous*. Here we have a substance that is misleading in name, appearance and taste, and forcibly reminds us of the scant faith we should put in appearances. Again, we find no copper in "copperas;" green vitriol and copperas are the same thing which you know by this time is in chemical languages—sulphate of iron; the sugar of lead is chemically named, acetate-of-lead. Now if you have followed me closely up to this point you will easily find the components of sugar of lead, or acetates of lead, to be lead and acetic acid, I may also tell you that acetic acid is also called vinegar; the vinegar you are familiar with is, or should be diluted acetic acid, the symbol for acetic acid is $C_2H_4O_2$. There is no silver in "German silver," it is an alloy of zinc, nickle and copper, "Oil of vitrol" is not an oil, nor does it contain oil, its chemical name is sulphuric acid, its symbol you

know by this time. There is no soda in "soda water," it is only water containing an excess of carbonic acid, this carbonic acid was obtained formerly by decomposing carbonate of soda, hence the name, but it is now obtained by decomposing marble dust, or carbonate of lime and much cheaper substance than the carbonate of soda. Black-lead contains no lead, a pure black-lead would be carbon only; neither does "milk of lime" contain any milk, nor does cream of tartar contain any cream; when I give you the chemical name you can readily arrive at its *qualitative* composition, for when I tell you it is a tartrate of potassium you at once conclude it to be composed of potassium and tartaric acid, and if I give you its symbol— $K_2H_2C_4H_4O_6$ —you can as easily arrive at its *quantitative* composition. I need scarcely tell you that milk of lime is only water thickened with an excess of lime. There is nothing of the lemon in "salts of lemon," the salts referred to are oxalates, and are therefore dependent on oxalic acid for their formation; lemons do not yield oxalic acid, they yield citric acid. Oxalic acid is very poisonous, but citric acid is not. Sulphuric ether is so named because sulphuric acid is used in its preparation, but it has no sulphur nor sulphuric acid in its composition.

This by no means completes the list of incongruous names still clinging to chemistry, many of them supplied by the al-chemists of long ago. Now doubtless we could get along still retaining those old time names and notions, but in so doing we must submit to be relegated to the class of the antique and obsolete. I think I have made clear to you the advantages of the new over the old nomenclature and have further shown up the utility of symbols. I have also introduced two new words above; they each convey pretty well their own meaning, but a few words representing their use and meaning may not be out of place.

When you send a piece of rock, metal or a liquid to a chemist for analysis he will generally take a small portion of it and by a series of systematic tests determine what elements are contained in that portion, for example, he may find in a mineral indications that it contains iron, alumina, silica, lime, potash and soda. This preliminary or *qualitative* analysis enables him to proceed straight forward for the quantities of each element, or to make the *quantitative*

tative analysis, and this may be it:

	No. 1.	No. 2.	No. 3.
Si O ₃	=60.62	or it may be 56.94	or 61.72
Al O ₃	=33.09	" " " 35.21	" 31.17
Fe ₂ O ₃	= 4.31	" " " 5.11	" 5.12
Ti. Acid	.61	" " " .33	" .17
Lime	.63	" " " .95	" .75
Mg. O	.50	" " " .92	" .89
Alk.	.28	" " " .51	" .49
	100.04	99.97	100.31

An analysis like any of these three would strike the advanced clayworker that it must be a fire-clay—These are actual analyses of Scotch fire-clays, No. 1 is from Glenboig fire brick works, where Mr. Dunnachie of kiln fame hails from. No. 2 is from the Gartcosh works and No. 3 from Glenva. The Glenboig was considered the best of the three so far as I could learn; with the other two, honors were about even.

Returning now to qualitative and quantitative, if I give you what I call "blue stone" or "blue vitrol" you gain no information as to its compositive *quality*, but if I call it sulphate of copper the name conveys the idea that it is sulphuric acid and copper in combination, and if I furnish you with the symbol—Cu SO₄, 5H₂ O—you have no difficulty in determining the quantity of its separate parts, thus

Cu	=	63.5
S	=	32.0
O ₄	=	64.0
5H ₂ O	=	90.0
		249.5

So that in 249½ pounds of blue vitrol there are 90 pounds of water of crystallization, 64 pounds of oxygen, 32 pounds sulphur and 63½ pounds of copper.

Dismissing for the present chemical nomenclature let us turn to chemical notation for a short time. I told you the meaning of the small figures just under and to the right of some symbols, but I think I did not explain the large figures sometimes placed immediately in front of a symbol or symbols of which you find examples in my last paper (C. W. for Aug.) and in the present one; in the present paper you find it just above in the symbol for sulphate of copper Cu SO₄, 5H₂ O and in the last paper you find it in Sulphate of iron,—Fe SO₄, 7H₂ O—and in sulphate of zinc—Zn SO₄, 7H₂ O—These all refer to the water of crystallization in these substances and they of course mean or express the number of atoms—or more correctly *molecules*—of water in the substance. You will find them frequently used in chemical formula, and they are called co-efficients of the quantity following them. *Chemical equations* are

very much like algebraic equations in appearance, but do not let that dishearten you, neither of them are half so shrouded in mystery as they appear to be; let us break it in with something easy and you will quickly comprehend it. We will pour some hydrochloric acid on a piece of marble or limestone, a reaction immediately takes place, now we will assume that the piece of marble weighed 100 grains—ounces, pounds, or tons are just as applicable in the case—and the hydrochloric acid weighs 73 grains. The following equation will represent the result of this reaction; Ca CO₃ + 2HCl = Ca Cl₂ + H₂ O + CO₂. Now an equation must be the same in quantity on each side of the equality sign (=) let us see if this is so, first, then we took 100 grains of marble (Ca CO₃) and added 73 grains of hydrochloric acid which makes 173 grains on one side of our equation; and the result is 111 grains of chloride of calcium; 18 grains water, and 44 grains of carbonic acid, the total of which is just 173 grains. We may verify the correctness of the equation another way, by splitting up each substance into its elements as follows:

	A.		B.	
Ca CO ₃ =	{ Ca and on the other side C O ₃	Ca Cl ₂ =	{ Ca Cl ₂	Ca Cl ₂
2H Cl =	{ Cl ₂ H ₂	H ₂ O =	{ H ₂ O	H ₂
		CO ₂ =	{ C O ₂	O ₃ C

You see, the columns A and B contain the same elements exactly but not in the same order.

W. WAPLINGTON.

THE FOLLOWING LETTER EXPLAINS ITSELF.

Office of

THE GRAHAM KAOLIN CO.,

Kaolin, Pa., Aug. 15, 1892.

C. W. RAYMOND & Co.,

Dayton, Ohio.

DEAR SIRs:—We have been experimenting with a number of represses, pressing silica brick—98⁵⁶/₁₀₀ per cent. silica—but find the Columbian is the only one that will do the work successfully.

You will please have ready at an early date one of these presses for our New Garden City Fire and Silica Brick Co., as we have concluded to place it in this works as soon as completed.

Yours Very Truly,

J. H. WELLER, Supt.

DRY CLAY BRICK PRESSES.

IN starting out to buy a brick machine many points should be considered, one of the most vital being whether the clay to be used is of such a nature as that it can be treated by the best process or whether it must be handled according to an inferior method.

Having settled upon the kind of machinery to be employed, the question arises, which is the best machine of that kind?

Fortunately the art of brickmaking has advanced in this country to the point where a clear judgement may be formed concerning all methods, the soft mud, stiff mud, semi-dry and dry clay, respectively from the earliest to the most advanced.—Supposing now the most advanced method, the dry clay is found suitable, a practical judgement as to machines can be obtained in the following manner: The Standard Dry Clay Brick is manufactured by the various Hydraulic Companies, located in different sections of the country, with headquarters at St. Louis, Mo. Now what machines or presses are in the open market actually making a dry

clay brick in every point equal to the hydraulic brick, at a cost not to exceed that of the hydraulic product? Our answer is, the now well known "Triumph" Dry Clay Brick Press, invented, owned and operated by Joseph J. Kulage of 1435 College Ave., St. Louis, Mo., because it has for more than 8 years demonstrated its success, working side by side with the said Hydraulic. It requires the minimum of investment for the maximum of output—and the presses that have been more than 8 years in continuous operation show no wear and are as good as new. These presses are now on the market, and the readers of the CLAY-WORKER contemplating the adoption of the dry clay process are advised to investigate their merits.

If you want anything you haven't got or have something you don't want, read or advertise in our "Wanted, For Sale, Etc.," columns.

A FANCY TALE ABOUT FANCY BRICK

IS about as good a time as any to confess that I know next to nothing about brickmaking, brickmakers or bricks. I have basely pretended that I was a connoisseur in clayworking matters, but I am a hollow mockery—about 39 girth measure. All

I know about the brickmaking industry and its kindred wind-dustry brick selling has been imbued into me by my friend Sympkyns—F. Cortez Sympkyns. Corty, as I and his intimates call him, assured me that he was a kilndried brick man from fourteen and a half miles northeast of Wayback. He is out of the brick industry now but his recollections of the halcyon days of his brick career bring tears to his eyes. He is in the janitor industry at present, but he assured me that while perhaps his reputation as a janitor was not up to sample, his record as a travelling brick salesman, superintendent of yards and general all-around expert was one round of continued success if not pleasure. I have



His recollections brought tears to his eyes

since found that Sympkyns has imposed on my guileless, sun dried nature—just for the cigars and sundry drinks that I tendered him in exchange for his wonderful fund of brick information.

All Sympkyn's knowledge in the clay line was obtained during his brief existence as a canvasser for the sale of the bricks made by "The Novelty Brick Association." Corty might have been in

the business longer only the concern failed and Corty Sympkyns had to take to janitoring for the Mosaic Apartment building.

The N. B. A. made a specialty of odd styles of bricks entirely and their failure was due solely to the public's want of appreciation of their efforts to spring novelties on the aforesaid unsuspecting public.

Among the novelties was the "Where-



Jumbles.

grandfatherwasborn" brick, made in exact imitation of the brick of sixty or seventy years ago. It had all the peculiarities of the original. There were little soft places on its surface, and places on its surface where bits of crockery (that had been dumped into the kiln) sticks out. There was the same arrangement of dirty greens and dismal browns and a general want of fluidity and plasticity. Then there was "The Neopolitan" brick which ought to have had a big sale but probably didn't just because it ought to have had. It was called "Neopolitan" for the reason that it was almost a *fac simile* of the ice cream of that nanie—about four layers of different colors. I should have named it the Pusse Cafe, which, no doubt would have assured it a permanent success. Another exceptionally fine brand (as I judge from the sample still in Sympkyn's possession), was the "Flor de Castile, but only one order for it was ever received and that was from a retired soap maker of Chicago, though to tell the truth the ex-soap man before his retirement manufactured only laundry soaps and never dabbled in even an imitation of the Castile of which the "Flor" was almost an exact reproduction, as far as appearance went.

Another brick, the result of misguided genius, was a fine pressed brick

with the oozing effect of salt petre artificially produced on its surface, but, somehow, it didn't take, although judging from the sample it couldn't be distinguished from the real article so frequently seen.

One brick among those made by the N. B. A. which should certainly have sold like hot cakes was the "Hash" brick, the outer surface of which was artistically studded with protruding hair pins, champagne corks, bottoms of bottles, bits of tomato cans and other household sundries. I should imagine that a house built of this brick would present a most sociable and harmoniously artistic *tout ensemble*, as we say in Norway; but it didn't take notwithstanding its vaccination appearance.

But, after all, I am glad I don't know too much about brick-making. What little I do know is almost productive of incipient brain fever, and certainly does conjure at night an article in the nightmare line that is superior to the brick itself. The poetic sketch entitled "Jumbles" is the result of my recollec-



Failure was due to the public's want of appreciation.

tion of a recent dream I had about the product of The Novelty Brick Association.

CHARLES LEDERER.

Written for the Clay-Worker

ARE BRICKMAKERS CATCHING THE SPIRIT OF MONOPOLY?

BY J. W. CRARY, SR.

AS monopoly of civil authority and government is revolution against it, so monopoly in the industrial pursuits of society is revolution against the general welfare. God, only, has the right to monopolize. It is treason against God and human rights for men to attempt it. Combinations for monopoly is usury, and usury is a mild insidious form of robbery.

THERE ARE TWO WAYS BY WHICH EVILS ARE CURED.

God has so ordained and fixed it, that when a proper sense of justice and

moral suasion fails to cure evils, the evil itself inherently possesses the power to cure itself and restore a proper and absolutely essential equilibrium of society. I need not point the intelligent reader to all the history of the past in proof of this fact.

This, our present age, is one of the most remarkable for material progress. It naturally inspires the people with a restless, avaricious and to a serious extent, a venal covetousness.

There are *things* we call progressive men, some of whom would like to own and control every railroad, some would like a monopoly of farms, and yet others who would lay claim to all the land not in farms, and those who are after all the mines, the great shops and manufactories, and so on, until a thousand money-wealth gluttons would own all the United States.

The brickmakers have always been so sublimely modest, I have not put any of them in this category, but I am not sure that one could not be found, who would like to control the entire list of respectable brick plants in the United States. Certainly, the tendency is to larger and more extended combinations and operations in the manufacture of brick.

I notice in Clay Journals that one or more companies are prepared to turn out from 100,000,000 to 200,000,000 brick yearly.

NOW LET US ANALYZE THIS PROPOSITION

Of one company to make 200,000,000 brick in one city or locality. This company will perhaps represent a half dozen respectable families of their own. They will need to employ at least eight hundred men. One-half of these have families, and live in little tenement houses; the other half board in tenement houses. Now, there must necessarily be, at least, one hundred skilled men besides the eight hundred laborers, every one of these skilled men, if they had a chance, could manufacture brick as well or better than their employers; each could make 2,000,000 brick yearly, at a profit of say, \$2,000; they would be proprietors of their own homes; each having a respectable family to aid and increase the moral and social welfare of the community. While, if only employes, under the control of a few capitalists, they could never hope to gain a competence for a living, or a high social position while mere wage-workers. But if each one could operate a small yard the locality would have one hundred

brick yards, whose combined output would equal the mammoth company, and whose diversified industry, enterprise and moral and social worth, and influence would be at least ten times greater than that of a single company.

If it is good policy for a company to make two hundred million of brick every year, why not improve the good policy and increase the product to ten times more?

DIVERSITY! DIVERSITY! IN ALL ESSENTIAL THINGS AND INDUSTRIES

Is the only successful rule of practice in a Government like ours. Centralism in capital means feudalism and vassalage, while segregation in capital and individual enterprise, means diffusion of wealth, industrial ambition and independence with legitimate, general progress. If we can have ten thrifty, middle-sized manufactories instead of one extremely big-sized one; if we can have ten small, thrifty farms instead of one big one; if we can have ten good, honest stores instead of one colossal house, with its numerous departments and spread-eagle show and sham, it would be infinitely better for the whole country in all respects.

WELL PROPORTIONED BIG THINGS ARE NOT OBJECTIONABLE.

A brick plant might turn out ten or twenty million of brick yearly in a large city, and not be far from the middle ground of the extremes; but until we alter our business system and laws so that every employe will be a stock holder, (which I think could and should be done fairly, so as to prevent strikes and produce a just equilibrium between labor and capital) twenty million of brick is enough for any one concern to make in one year.

THE COUNTRY NEEDS MORE SMALL, WELL QUALIFIED BRICKMAKERS.

In almost every small town or city there is a want of first-rate brick, for the reason that there is a scarcity of real skilled experts in the business.

In the matter of experts, Bro. Morrison has, in the Aug. CLAY-WORKER, given able and well-timed form and expression to a feasible plan for schooling brickmakers. I have spoken in these columns in general terms, of the want and practicability of a regular school for teaching practical and technical brick-making, and I cordially endorse all that Bro. Morrison has said on the subject. I claim no precedence in the matter, nor do I desire to take a front seat in brick-

makers company; but I would help Bro. Morrison to further suggest to the N. B. M. A. that, that body should, at their next convention, unanimously petition Congress for a small appropriation say, \$1,000 for each State, to aid the N. B. M. A., which should supplement the national gift by a subscription of not less than \$10.00 for each member to the consummation of the project.

Millions upon millions are given by Congress to objects far less worthy, and of less public importance, and I have not a single doubt but that Congress would promptly respond to the request by an over whelming majority. Even the old "Hoosier State" "*objector*" member, would vote aye. I would favor a central city, or place for this enterprise, where all needed facilities are at hand, and where clays from all parts of the country could be easily sent for test and experimental work.

THE INSTITUTION COULD BE MADE SELF-SUPPORTING.

All the different clays and processes of the art of brickmaking and other clayworking, if advisable, would be practically shown and scientifically explained. Each student would be required to work say, five hours each day, then get and have lessons five hours. All board and lodging free. Several millions of first-class brick could be made every year besides ornamental clay work of all kinds. The demand for the product of this institution would be unlimited.

LOAFING.

We occasionally visit tile and brick works where we find an unnecessary amount of loafing, not only by outsiders but by the employes themselves. Any little mishap or breakage of machinery requiring an hour or so to repair it, is the occasion of a general loafing of the hands. There are many things about a tile works that might and ought to be done at such times. Why allow such loafing? It breeds a general demoralization in the conduct of the works. Besides it is an inducement to some lazy, unprincipled employe to cause the breakage or derangement of the machinery, so as to get time to loaf while it is being put to rights. Find something for the hands to do at such times—even if it is not very important. Put them cleaning up the premises if they need it, or to removing or resetting the tile or brick—or anything to keep them employed during the working hours.

Written for the Clay-Worker.

A LARGE BRICK PLANT.

PHILADELPHIA has long been famed the world over for the superior quality and general excellence of the brick manufactured within her borders.

Of the large number of firms engaged in this field of industrial enterprise there are few that rival and none that surpass the Jarden Brick Company of Philadelphia, either as regards the quality or quantity of output.

The company is the outgrowth of the business established by Jacob Jarden in 1837. Mr. Jarden increased his facilities according to the demand for his brick, until he built up a trade of vast proportions and made the reputation for the product of his works wide spread the country over.

In 1886, the firm of J. E. Jarden & Co., was organized and three years later

The brick are made of the best tempered clay, of which the company owns an inexhaustible supply.

Mr. Henry C. Webster, whose genial face is pictured on page 227 of this magazine is president of this great and successful company. He is a practical expert of many years experience in the manufacture of brick, and has mastered every detail of the business. He is considered by the brickmakers of Philadelphia one of the most practical brickmakers of the country. He began at the bottom of the ladder of brickmaking and has made his way to the top by his persistent effort, grit and business capacity. Mr. Webster keeps close supervision over the entire business but is ably seconded by Mr. W. L. Elkins, vice president of the company, who is one of Philadelphia's largest capitalists and most successful financiers. He is well remembered as a pioneer in the oil refining industry in Philadelphia and con-

important part in placing Philadelphia in the front rank of the great manufacturing cities of America. Its work is of an enduring character and reflects great credit upon those who have directed its affairs.

ANON.

VITRIFIED BRICK THE CHEAPEST AND BEST.

We have in the vitrified brick pavement, says H. L. Weber, C. E., the combined good qualities of the granite and cedar blocks, the ashler, the macadam, the cobble stone, the gravel and the asphalt, without a single one of their objectionable features, and this, too, at a cost only a trifle in advance of the cheapest pavement (cedar blocks) as is shown by the following which is taken from a "table of averages from a compilation of the cost of these four leading paving materials in twenty different cities, which gives the following results: Granite, \$3 per square yard;



WORKS OF THE JARDEN BRICK CO., PHILADELPHIA, PA.

the business had acquired such proportions as to require additional capital and resources to meet the demand, and the Jarden Brick Company was organized and incorporated for this purpose in August, 1889, with a paid up capital stock of \$1,000,000 with financial backing and credit practically unlimited. The works were largely increased and extended, and as now equipped, the plant is one of the most complete if not the largest in the United States. The works have a capacity of 50,000,000 brick per annum, with an actual output of 35,000,000.

The company manufacture pressed brick of all shapes and designs, and of all shades, as well, in mottled buff work and also all kinds of special designs are made on order.

trolled the business there for years.

Mr. George D. Widener, the able treasurer of the company, is a son of Mr. T. Widener, one of Philadelphia's wealthiest citizens, and who is closely associated with Mr. Elkins in all his vast enterprises.

Mr. R. E. Eggleston, the efficient secretary of the company, is a comparatively young man and has managed the internal affairs of the company with rare tact and skill, and by his ability and liberal methods coupled with his immense popularity among the builders has added largely to the trade and reputation of the concern.

The Jarden Brick Company has not only furnished a large proportion of the material for the erection of many of our most important buildings but as a large producer and shipper has played an

vitrified brick, \$1.75 per square yard." Brick cost fifty-nine per cent. of asphalt, and 117 per cent. of cedar block.

It is evident from this that the twenty cities from which rates were obtained to compile the above averages, could by abandoning the use of granite, and substituting vitrified brick therefor, construct and perpetually maintain in perfect condition the street of the future, "a vitrified brick street," for the first cost of a granite street.

He Reads It.

Editor Clay-Worker:

Enclosed find express order for \$2.00 to renew my subscription to your valuable journal, which I find a veritable mine of instruction and interest.

E. J. BURKE.

CORRESPONDENCE.

THESE COLUMNS ARE OPEN TO ALL. THE FULL NAME AND ADDRESS IS REQUIRED BUT WILL NOT BE PUBLISHED EXCEPT WHEN PERMISSION IS GIVEN BY CORRESPONDENT. THOSE DESIRING TO COMMUNICATE PRIVATELY WITH ANY CORRESPONDENT WHOSE FULL NAME IS NOT GIVEN CAN DO SO BY ADDRESSING LETTERS CARE OF CLAY-WORKER.

Glazed Roofing Tiles.

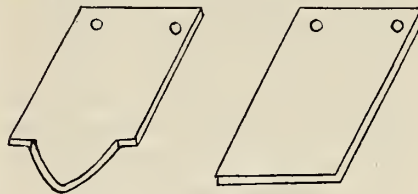
Editor Clay-Worker:

In the manufacture of all glazed goods, the preparation of the clay is a very important matter. Too much stress cannot be laid on this point. There is no glaze that will take well on a rough body and there are some glazes that will not flux at all unless they are put on a specially prepared body. Therefore, this point cannot be too closely insisted upon, as it is one of the main features in the manufacture of roofing tiles, glazed or unglazed, but especially so in glazed tiles. What then is necessary is that the clay should be finely ground and well and evenly tempered. If this is done, the tile when made will be of a close, compact and even texture, and therefore help, in a great measure, to resist the moisture that would fall upon them, even if they are not thoroughly vitrified, but if thoroughly vitrified they will present one level, homogeneous mass through which no moisture can by any possibility ever penetrate, and, further, it will give a smooth, even and level surface for the glazes, which will add greatly to its beauty and render it more agreeable and pleasing to the eye.

In my last paper I said there were three methods by which we might make glazed roofing tile. They all have some points in common, but they each have features separate and distinct from the other.

I propose to take the most easy, though the oldest, method first, not merely for the purpose of showing how glazed tiles were made fifty years ago, but because the conditions and circumstances surrounding the bulk of the brickmaking in your country are such as prevailed in this at that time, and prevails now in

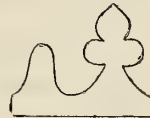
this country in many county places, and as these tiles can be made on these yards and burned along with the brick, this method will be adapted to the facilities at command in many places and enable any manufacturer to make tile of a very fair quality. I here show a few common patterns of tiles. These make a good roof and can be made with any hand machine and need not be pressed if care is taken in taking them from the machine and the boards on which they are placed are level. But should it be desirable to put a little better finish on them, they may be put on



Plain Tile.



RIDGE TILE AND CREST



CREST



SPANISH OR S TILE



IMPROVED PAN TILE



CORRUGATED TILE



IMPROVED CORRUGATED TILE

a "horse," made, of course, of the shape of the tile and all rough edges washed off and brought back to the proper shape. When they are stiff enough to handle, they should be drawn off the boards five in a bunch and put down on end to dry. This will keep them from twisting out of shape, and when they are thoroughly dry they will be ready for glazing. This operation is very simple and may be performed by any boy after a few minutes practice. The

vessel to hold the glaze should be large enough to hold 20 gallons. There must be a pallet with which to stir up the glaze and two strips of wood long enough to reach across the tub, these must be put on about six inches apart and fastened by a screw at each end to keep them in place. These with a small wooden dish to hold three half pints will be all the "tools" necessary. Now to get through the work quickly there should be three boys or a man and two boys. One should take up the tile, brush off all the dirt and dust that may be on it, and then wipe it over with a wet sponge. The second person should take it and rest it on the two strips over the tub, tip it back in a slanting position, take up the wooden dish with the glaze and draw it across the tile, taking care that every spot is covered with glaze, then lift up the tile and draw the finger across the bottom of the glaze and hand it to the third person to put on the board to receive it. It will be seen that the lap of the tile need not be glazed; that is, if 3 inches or 3½ inches of lap is given, two inches of the lap may be left unglazed. When the tile are taken up to be carried to the kiln the hand should be rubbed along the bottom end of each; this will take off all the glaze and prevent them from sticking when burned.

Before saying anything about the setting, we must say a word about the kiln, and taking into consideration the nature of the glaze that is to be put on these tiles, it must be an updraft kiln (the shape or size of the kiln is quite immaterial) we shall have more to say later on about the kiln, but as we intended this paper to benefit those whose facilities are limited, we must confine ourselves to that kind of a kiln that is in most general use, which is the old square open top up draft kiln. This is the oldest style of kiln I know of and it still holds its grounds in many country yards. The setting of these kilns is well described by your correspondent "R."

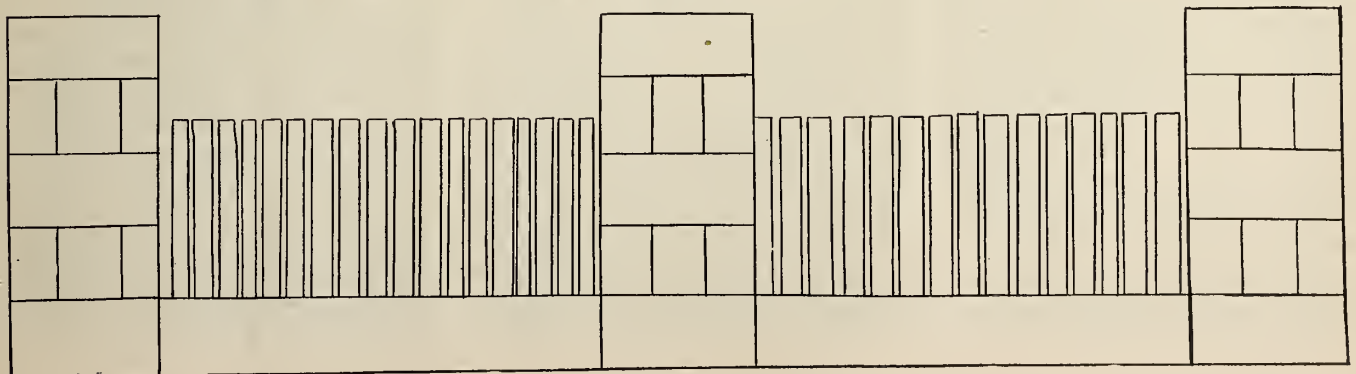


FIG. 1.

CROSS SECTION SHOWING THE TILE WHEN SET IN KILN

Brick" in the June issue, page 655, and needs nothing from me. After the bottom or the benches have been set and the chequer course put on, start to set the top in the usual way until there is room for three or four courses deep of tile on the top, bringing them up to within one foot of the top of kiln. This amount of space must be set with brick, thereby covering the tile in such a way as to prevent any damage coming to them when burning. The way to set the tile is shown in the two sketches enclosed. In No. 1 is shown a row set across the kiln. First, there should be set a 9-inch blade of brick then a row of tile. Set a pillar of brick and then 30 tile and then a pillar of brick and then 30 tile and continue this across the kiln. When this row of tile is set put in another blade of brick and so continue brick and tile alternately through the kiln. Looking at

materials and receipts supplied by me and on the lines laid down in the series of papers written for and lately appearing in the *CLAY-WORKER*. Particulars and reference can be had in the usual way.

New York News.

Editor *Clay-Worker*:

Many of your readers, no doubt, thought it strange that your last number contained no account of the strike in New York City. As the law laid down by your office requires "copy" to be in some days before the day of issue, I was not able to give anything in regard to it, but just the beginning of the trouble.

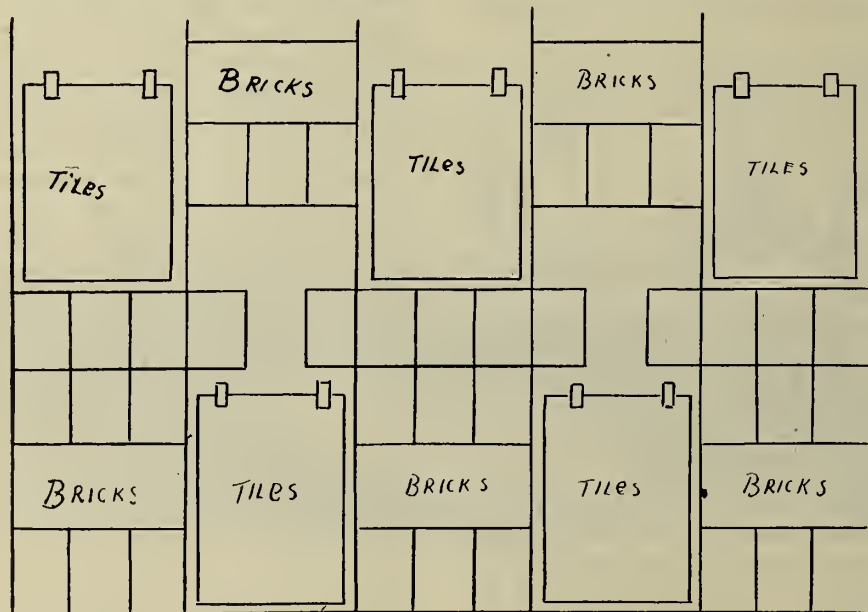
You mention the incident where a contractor at Passaic, N. J., about five miles from Hackensack, threatened to break the neck of His Mightiness, the Walking Delegate, if he did not get out. This resulted in calling out all masons

"United Labor." "United we stand, divided we fall" looms up prominently in this case, as past experience with labor troubles has shown. It was estimated that during the recent troubles 15,000 men were idle for three weeks at a loss in wages of one million dollars, an average of four dollars a day for each man, and that in some cases for eight or nine hours work. Just think of poor "down trodden," "oppressed labor," earning four dollars a day.

The contest cost the building material men quite a sum of money, but the gain that will result in more ways than one is not to be counted by dollars and cents. It has brought them as business men closer together, not to say anything of the signal victory in the fight. Strange as it may seem, the strikers commenced it, carried it on, and were defeated on their own grounds.

Quixote went out to fight the wind-mill. Just so, the strikers, with all their talk, which was nothing but wind, from day to day would order strikes on buildings that were not receiving material, throwing their own men out of work, for what. No one but a walking delegate could tell, and it is doubted if he could explain his actions in the matter. Keeping material from masons, plasterers, lathers and men who wanted to work but were compelled to walk the streets without any grievances against their bosses, but simply because they had been ordered out. It lasted three weeks, until the German framers, ignoring the walking delegate, went back to work. After three weeks of idleness, the walking delegate ordered the men back to work, and made the best terms they could. If they had not declared the strike off, the men would have gone back to work on their own accord. The walking delegate has not seen fit to make any excuse for the strike. At present the outlook is that his Mightiness has lost his hold.

What position do the Unions hold at present compared to the power they had as a body before the strike. As a body, they were strong. The material men were as individuals. By this strike labor has forced the material men to join as a body the United Building Trades' Club. There is unity with a vengeance. A union of all the business men engaged in the erection of houses. Carpenters, masons, iron men, painters, paper hangers; in fact, all bosses combined together to stand by one another and force the fighting if one of their



END SECTION SHOWING EACH ALTERNATE BLADE OF BRICK AND TILES

FIG 2.

sketch No. 2 you will see the brick overhang the tile and the next row of tile is shifted on to the blade of brick and this plan can be carried out throughout the kiln. The marks 1. 1. are small pieces of clay put between the tiles to prevent them from sticking together, and it will be seen that there is no weight on the tile. They are simply put in a box, each tile taking its own weight and every inch of ground fully occupied.

MANAGER.

P. S.—I have just received a sample enameled brick out of the first kiln of brick burned in America made from

at work on the building. The next day the contractor put them all to work again. It is a pity that the walking delegate did not insist on his getting down on his knees and begging his pardon. Such men are not fit to have control, if they have not backbone enough to see the matter settled in their own way. Let the great bird of Freedom alight on the top of the Washington monument and scream "Vici" in tones loud enough to be heard all over the States, so that all men engaged in a similar line of trade may see what a united body accomplished against the great bugbear,

number is discriminated against.

The old saying that "The worm will turn" is verified here. No reduction of wages or hours is threatened, only it means that labor must behave itself, or capital will take a hand in the fight and see who can stand it the longest. There is no one to blame but Labor, or the ruling spirits of the organizations.

In my July letter is mentioned the fact that the brick captains were keeping a lookout, as in all probability they would be in it. Sure enough they were. The barges that were at points to discharge cargo when the strike commenced could not unload, as in some cases where they had brick handlers that belonged to the union, they would not work and would not let the crew.

As many of your readers may not know what a brick handler is, I may say that each barge carries a crew of four men, and as many of the brick are piled and the piles vary in length from two to three hundred long, it requires extra men, who are paid at the rate of 40 cents per M. Or say, the barge carries two hundred and fifty M, the percentage would be just \$100.00. As there are two men they will receive two-sixths of the \$100.00 as pay for their labor. In some cases they earn it in two days and sometimes it takes four. He is somewhat giving to taking his time in the morning getting to work while the crew will be working, for which he will get his pay. He is rather inclined to visit the liquor saloons at frequent periods while others do his work. He belongs to the Union and during the strike would not work.

I also said that the "Ship" association would also be heard from in all probability in August. Well, she has been heard from and in tones not to be misunderstood. About every brickmaker is a barge owner. The "Admiral" of the fleet called his captains together on the 21st of July, when he issued the following order:

Officers of the Associated Brick Co.
of New York and New Jersey,
135 Broadway, New York, July 23, 1892.
At a general meeting of this Association, held at the Astor House, Thursday, July 21, the following resolutions were adopted:

Resolved, That the Associated Brick Company of New York and New Jersey join the United Trades' Club, and

Resolved, That we will not submit to dictation by the Brick Handlers' Union or any other Union, also,

Resolved, That we, who are owners of barges or vessels engaged in the brick carrying business, employ only such men as will unload and deliver our brick to any party or to any place where they may be ordered by their employers or their agents.

Nor will we employ any brick handlers to unload our vessels unless we need them and then to pay them only for the brick they actually handle.

* * * * *

JAS. E. SCOTT, Sec.

The strike developed that many of the men on the vessel belonged to the Union, with the result that many of them are looking for a job. The brick handlers are now eating humble pie, and where before the strike, they had the say as to how many extra men should be put on, now they are not in it. Can any one say other than that the strike was a blessing, even though costly.

If something would turn up that would cause the captains that manufacture brick to pull together, there would be great rejoicing among those that place their brick in the New Jersey market. There has been a good deal of dry weather the past month, but the men are scarce.

Mr. J. W. Gillies and the Gardner Bros. of this place, stopped molding the first of September. Felter & Christie at Haverstraw, stopped ten days ago, and several of the Up River yards have closed. The demand is light and the prices low, and one of the manufacturers at Haverstraw had his barge brought back to Haverstraw when the strike commenced. When the strike was over he had her towed back and the cargo was sold at \$4.87½ per M. How is that for Haverstraw brick? There are many thousands of Jersey's and Up River's that sell for \$4.50 per M. It is now about time to stop making.

Death has claimed about the oldest brickmaker on the Hudson River, Mr. Thomas Aldridge, Sr., father of the Aldridge Bros., of Dutchess Junction. He had lived more than three score and ten. The seventy-fifth mile stone in his life's journey had been passed. Mr. Aldridge was a man of sterling integrity, respected and honored by all who knew him. His death is a loss to the community in which he lived. A consistent Christian, a loving father, a faithful friend can truly be said of him.

The walking delegate is in trouble. In other years he was the one that was making trouble. He is being snubbed and shoved, and, I was going to say, kicked away from a job when he comes to see if there are any non-union men at work. Within the past few days, they discovered a boss who did not employ all union men. When they went to investigate the matter, the boss shoved them into the street, without the formality of apologizing. The Board

of walking delegates threatens to order a strike if they do not receive satisfactory explanation. Before the recent strike, if His Mightiness had received such treatment, he would have ordered a strike at once. He is afraid to do it now, for fear the men will not obey his orders. How the Mighty has fallen!

A. N. OLDTIMER,

Hackensack, N. J.

Ohio Valley Clayworkers.

Editor Clay-Worker:

The Great Western, Calumet, Excelsior and Forest City Sewer Pipe Works, of Toronto, Ohio, have been since last October burning their kilns with natural gas most successfully; but lately the pressure has been so low and gas so scarce that they have all returned to coal, as the uneven heat has a tendency to crack the pipe.

All the works are running to their full capacity and cannot keep pace with their orders. They all complain of a scarcity of cars for shipment. The big demand at present is for pipe from 6 to 12 inches.

The boiler at the works of the New Cumberland Fire Clay Co., at Browns, Ohio, exploded Aug. 17th, doing great damage to the plant and scalding the engineer to death. New boilers are now being placed and the repairs about all complete.

Steubenville, Ohio, again shows her preference for fire brick pavements. Sealed proposals will be received until September 13th for paving seven squares with vitrified fire brick. This will complete the paving.

The Vanport Fire Brick Works at Vanport, Pa., was destroyed by fire Aug. 26. It was not heavily insured. Rebuilding has commenced.

On September 12th, Wm. G. Barnard, proprietor of Barnard's Brick and Tile Works, Bellaire, Ohio, met with a cruel death. He was in his works and stepped from a door to a tramway on which loaded cars of clay are run from the mine to the crusher. Just at that instant a loaded car struck him and passed over his leg crushing it to a jelly. It had to be amputated, and he never recovered from the shock, dying that afternoon.

Mr. Barnard was 79 years of age and had only been operating his works about a year. The paving brick business was a new departure for him. Notwithstanding his age he was a

shrewd and careful business man and was doing a most profitable brick business.

Bellaire loses one of her sturdiest and most substantial citizens. He leaves an estate of \$200,000.

The many sewer pipe manufacturers have been holding meetings at Toronto, Pittsburg, Columbus and Akron, for over two months, which have been as secret almost as a Masonic communication. From what can be learned, they expect to form a large trust, embracing all manufacturers.

Each plant will be taken in at a certain price to be arranged to the satisfaction of the owners, and form a company with a capital of \$7,000,000, after the plan of the mammoth corporation known as the United States Glass Company.

Aug. 26th, the Diamond Fire Clay Company, of Uhrichsville, Ohio, made the largest single shipment of sewer pipe on record. It consisted of forty car loads and made a full train. There were over 30,000 feet of pipe, principally 18-inch.

An Important Branch of Clay Work.

Editor Clay-Worker:

Of the many valuable contributions with which every number of the CLAY-WORKER is replete, there are none which I consider more practically valuable than those on glazes and enamels, signed "Manager."

This writer seems, through the CLAY-WORKER, to have placed immediately within the reach of every worker of clay, of ordinary intelligence, a business which opens up a wide and most remunerative field in the manufacture of glazed and enameled ware. In addition, he offers to supply all information necessary (and even the enamel required) on terms so moderate as to be purely nominal.

My object in writing on this subject at this time, is to lay before your readers an extract from a letter this moment received from this gentleman, which confirms me in the belief, that not only is there the best market, probably in the world, for this class of ware, right at the door of the American manufacturer, but that the raw material is also at hand to ensure success from the start.

The following is the extract referred to:

"I have had clay sent to me for trial from a gentleman in the State of Ohio,

and I returned the samples last Saturday, in five colors, including white; and I can assure you that the best I can say about them would be no exaggeration of the truth. It is red clay and the samples are simply beautiful. The fact is, we have no such clay in this country. It is a blood red when thoroughly vitrified, and like a piece of steel for hardness. It almost takes a sledge-hammer to break it, and it is my firm belief that the highest branches of the clayworker's art are obtainable in your country, but I doubt very much whether any advantage will be taken of what I have placed within the reach of your manufacturers—I leave that with them."

If the clayworkers of America do not know a good thing when it is "placed within their reach" well enough to "take advantage of it," they certainly ought not to complain of "hard times" when the market is flooded with common building brick, and a yawning demand for roofing tile and glazed and enameled ware, which the small supply principally obtained from abroad, does not even pretend to begin to fill.

R. M. GREER.

Tuxpam, Mexico.

P. S.—I ought, perhaps to add, that I have been for some little time experimenting, more or less with samples of these enamels, supplied with instructions how to proceed, by this gentleman, and that I have, after a few trials, obtained results, which, considering the rough treatment to which they have been subjected, I can only describe as simply astonishing.

Don't Have To Go To the Sea Shore.

Editor Clay-Worker:

I am now engaged with the Selden Brick Co. of this city. Have been too busy since my arrival here to enable me to give you any information as regards the brick business.

Only this, there are five yards making as I understand 15,000,000 per year. The clay is of a very sandy nature but makes a good hard brick when properly burned, a good demand has caused a scarcity of brick already, although Mr. Selden tells me they had over a million and a half in stock to begin the season with. We use a Potts machine and now make about 200,000 per week, with better facilities for delivering clay to the machine, and drying will materially increase the output. The dryer now in use is an enclosed structure of wood

with many leaks, hot air is forced through by an immense blower, about half the product goes through this dryer and balance onto an outside yard, which of course requires a great deal of space and attention.

The yards are situated on the shore of Lake Erie, and really almost on the spot where a large portion of revolutionary history obtained its source, a magnificent view of the lake may be had from the clay banks, and one can well imagine himself on the beach of "old ocean."

Erie is the most beautiful city of Pennsylvania and a most delightful breeze from the lake makes it a very desirable place spend the summer months.

I enjoyed the pleasure of a very friendly call from our neighbor Mr. Dunn last week, whose yard joins on the East, and he appears to be a very pleasant gentleman and has grown gray in the business.

I should like to hear from parties who have dryers and iron pallets "For Sale."

Some day when I have become better acquainted hereabouts, I shall give you a more general account of the make up and material resources. I suppose you are already aware that Erie claims the honor of manufacturing more boilers and engines, than any other city in the U. S. Indeed one will be astonished to see the large number of machine shops hereabouts.

Some of them by the way might help their sales by advertising in the CLAY-WORKER.

I must close now as dinner is about ready and you know a clayworker always has an appetite for a good dinner
Erie, Pa. W. R.

Philadelphia News.

Editor Clay-Worker:

The dog-day's heat seems to have produced no perceptible slackening activity in building lines. There has been and are at present a great many buildings contracted for and under way many of which are large operations; the kind that will eat up a great many million brick this season. About the only complaint clayworkers have is about the narrow profits, but they see no other way out of the dilemma than to keep pegging away, and depend upon increased output to more than overbalance the small profits. The Peerless Brick Co., Murrell Dobbins and the Jarden Brick Co. have been particularly busy supplying pressed and fancy bricks. There is a strong demand for

brick from South America; one consignment of 3,000,000 was made in that direction this week. Murrell Dobbins also shipped a cargo of special sized salmon to Cuba the past week, and expects to ship a great many more during the fall months.

The manufacturers of brick machinery and clayworkers in general are fairly well employed. In fact the past season has been an unusually brisk one in nearly all the departments that go toward brickmaking, and clayworking, and if the margin of profits would have only equaled the volume of business there would have been no cause for complaint.

The Geolith Tile Manufacturing Co. of this city, is a newly incorporated concern, under the patent of Dr. Ludwig Preussner, an accomplished German inventor, in the production of a remarkably new tiling, which is not only claimed to be more durable, but cheaper as well, than any now made. Dr. Ludwig, who is president of the new company, made the tiles in Germany for a short time, but soon realized that America presented the really best and proper field for such an invention, so he came here and organized the present company, which consist of C. Emil Ronne, secretary Mr. Anthony Meny, treasurer. The company have now a completed plant in operation, and they are also embracing table tops, mantel pieces and fancy articles in general, in their product.

Philadelphia is now turning its attention to asphalt for paving purposes. Broad St., the principle thoroughfare, will be paved with that material.

The vitrified brick obtained from West Virginia, however, is claimed to be far superior to anything now used when even surface is taken into consideration. As to durability it seems to have withstood the test required of it by authorities who authorized their use. In Germantown and West Philadelphia there is block after block paved with this quality of brick and the streets are now in as good condition as when first laid some four years ago, and it is evidently increasing in popularity. Why this brick is not universally laid where the travel is not so heavy is a question that puzzles many people.

Joseph Alburger, an old brick manufacturer, has sold out his interest and embarked in the real estate business with Thomas & Sons, and report says he is a happy man.

Graham & Co's. brickyards at Bordentown, N. J., has resumed operations after a short shut down.

The Jarden Brick Co. are about as busy as they can be on fancy and other qualities of brick as well.

There is a talk of some builders introducing the white brick—a late invention—made precisely as the old style red brick. When white brick are introduced it will most likely lead to the manufacture of brick of other colors, brown in all shades, as well as red in like varieties.

The mammoth new Boyd machine, gotten up for the Jarden Brick Co., is now in use and gives very general satisfaction. The machine will turn out 3,000 evenly pressed brick per hour without any special effort.

ANON.

All In The Family.

Editor Clay Worker:

It might appear ungrateful, or it might be construed into uppishness if I were to let pass in silence the eulogies passed on me by Father Crary, Bros. Brick, Greer, William and some who have written me privately and to whom I still owe replies, and must owe them, as I really have not the time to spare for any extensive private correspondence circle. I simply wish to say it affords me much gratification to think my efforts are appreciated and I heartily thank them all. To Father Crary I would say in the words of Burns in his reply to a letter from Willie Simpson, a schoolmaster of Ochiltree—and a great admirer of Burns:

I got your letter winsome Willie;
Wi gratefu' heart I thank you brawlie; (1)
Tho' I maun (2) say't I wad (3) he silly,
A'n unco (4) vain,
Should I helieve my coaxin' hillie, (5)
Your flatterin' strain.

But I'se (6) helieve ye kindly meant it,
I sud (7) be laith (8) to think ye hinted
Ironic satire, sidelins skinted, (9)
On my poor music; (10)
Tho' in sie (11) phraisin (12) terms ye've penn'd it,
I scarce excuse ye.

Now this may not be to the point in every particular but the spirit of my reply is contained in those few lines. I have Anglicised the dialect for the benefit of those of our readers who do not appreciate Burns to the full, because, as Cowper says, "they do not understand him." This reply is applicable to more of my admirers than Mr. Crary, and, by the bye, my friends, are we not drifting

1 Heartily, 2 Must, 3 Would, 4 Very, 5 Brother, 6 I shall, 7 Should, 8 Loath, 9 A sidelong glance, or as we would say "over the left," 10 Muse, 11 Such, 12 Flattering.

towards the establishment of one of Dicken's Mutual Admiration Societies? Because, if so, I propose for admission without their consent or voice in the matter, L. H. Gibson, Chas. Lederer, D. W. Stookey, J. S. Reep, Kali, Manager, the whole family of Anons and Initials, W. A. Eudaly, Anthony Ittner, E. M. Pike, A. N. Oldtimer, Capt. Crafts, etc., etc. These *et ceterus* include T. A. R. and his staff and all the contributors to the C. W. that have missed naming.

If there are any new candidates for admission the terms are, contribute for and to the C. W. and you become at once a full fledged member.

WM. WAPLINGTON.

St. Louis and Vicinity.

Editor Clay Worker:

Everything routine, and nothing out of the common has been the condition of affairs for the past month. In this quarter prices on the whole have remained stationary, ranging from \$5.50 to \$5.75 for merchantable, \$6 for ordinary, and \$7 for strictly hard. Some sales have been made as low as \$5.35 and \$5.25 for merchantable, but they were on short hauls, where many stock and ornamental were used.

The demand has been strong and steady, and nearly all the brick which had accumulated during the Planing Mill strike have been disposed of. The yards are pretty well sold up now, and this encourages some to look for better prices, but it is difficult to see how any advance can be sustained, as the building season is far advanced, and the production is fully up to the consumption. Then next year the Hydraulic Company will increase their production by 20,000,000, which will certainly check any advance attempted then.

The Illinois Supply and Construction Company have got their yard at Collinsville under way, having started the press going on the 8th inst. Within a week or two they will invite their stockholders and friends up to view the yard, and the first products of the new enterprise. The affair will be held on Sunday to enable as many of the contractors as possible to take advantage of the excursion. This company reports an excellent sale of their Quincy Clay Gatherers, and also their other specialty, a triangular plow, or harrow, which plows up the clay to a uniform depth of from one to two inches.

The yards are interested just now in

the Mallinekrodt building on the north-west corner of Ninth and Washington Ave. It is a buff brick job, seven stories, 100 x 150 feet. It is expected to be let this week.

The Barnett Brick Company has fully recovered from the recent fire, having entirely replaced the destroyed section with permanent sheds. They have an excellently arranged and fitted out yard, and are doing a first class business.

Anthony Ittner is in Buffalo, attending the dedication of the Builders' Exchange there, but in the meantime his yards are kept running to their full capacity under the supervision of his son George.

Terra cotta work is in constant growing demand, and as a consequence, the Winkle Terra Cotta Company have all they can do. They are still at work on their new catalogue. It should have ready some months ago, but the cuts were a failure, and the job had to be all done over again. To have it properly done they have found it necessary to rig out a photograph gallery and dark room at their works in Cheltenham. Among the large jobs recently secured by this company are; State Agricultural College, Ames, Iowa; Dunklin County (Mo.) Court House, Kennett; St. Louis Kuenstler Verein (Art Club) St. Louis; Schwab Building, Nashville, Tenn. The Kuenstler Verein they state, will be one of the handsomest pieces of terra cotta work ever constructed.

The Fire Brick and Sewer Pipe people are having all they can do to keep up with contracts made early in the year. All the buyers are urging immediate shipments, and the yards are kept in a constant rush.

There was a slight advance on prices during the past fortnight, but it avails the contractors but little, as nearly all contracts for the season were already made, and at very close figures.

Evens & Howard have come into the market with their fancy gray and buff brick, and secured the contract for W. H. Thornburgh's handsome residence in Westmoreland Place.

One of the most interesting society events of the month was the marriage of Miss Lena Flad to Mr. Laclde J. Howard, on Thursday, September 7. Mr. Howard is a member of the firm of Evens & Howard, and the bride is a daughter of the celebrated Engineer and

ex-President of the St. Louis Board of Improvements, Mr. Henry Flad. The ceremony was a very quiet one. It occurred at the residence of the bride's father, in the presence of only the relatives and intimate friends of the contracting parties. Rev. Dr. Birkley officiated. It was their intention to make a tour of Europe, but the cholera interfered. They will visit all the principal American cities instead.

TERRA COTTA.

"Strikes."

Editor Clay-Worker:

It is well known and understood that the CLAY-WORKER is, in all respects, non-partisan in politics. But in all economic questions, the CLAY-WORKER is in no way circumscribed by neutral grounds. There are over 8,000 brick-makers in the United States, then other clayworkers, (I have not the statistical figures at hand,) but I think in round numbers, it is safe to say, there are 10,000 *clayworkers* in this country, who will average at least fifteen employees each.

Now, these 150,000 employees are as likely to form labor unions and carry on Strikes as other labor departments, and the discussion of the question of Strikes is not only a legitimate one for the CLAY-WORKER, but it may take an active and well pronounced hand in it.

WHAT IS AND MUST BE THE TRUE SOLUTION OF THE QUESTION?

In all social and economic questions it is those directly concerned who must first discover the wrongs and point out the true remedies. It is in vain that we seek the redress of wrongs in politics or politicians. They are the creatures and tools of the people, and the condensed will of the majority of the people must guide and control representative men.

We have grown up with the notion, (for it is only a notion,) that somehow or other capital and labor are two distinct, incoherent, antagonistic factors in the life and business of a people; that the man who labors and makes a dollar is one thing, and the man who, by virtue of his position as employers, or as a necessary factor, agent or broker, is quite another, when in fact, and in justice they are just as inseparable and identical in interest, and should be in sympathy, as the hand and the head.

While the hand must be directed and controlled by the head, still the head is just as dependent as the hand,

and must necessarily share pains and penalties as well as pleasures with it, each have their respective duties and functions to perform. The head must keep the hand out of mischief, or from being hurt, while the hand must respond to the will of the head. The hand cannot say to the head, "I will 'Strike' unless you give me gloves to work in, and fine toilet soaps to wash with, and gold finger rings to wear and a nice, easy job to do," nor can the head say to the hand, "I am your boss and master; I have saved enough of your earnings to make me independent, ignore and hold in contempt your wants, and will 'shut down' on you."

A NEW SYSTEM OF LABOR AND CAPITAL MUST BE ESTABLISHED.

Our times and marvelous progress demand that every vestige of barony, feudalism and plutocracy must, and shall be wiped out, and that capital and labor be so adjusted that each will share alike in justice and equity, and that the interest in each will be identical and mutually, and voluntarily dependent.

I don't believe in "Glittering generalities," like party platforms, which are generally so indefinite that they suit the tricks, turns and interests of the party, and deceive the people.

As we have seen, capital and labor is all one and the same thing. One would starve to death without the other. An equitable division is all that is needed to make both prosperous, contented and happy.

I INVITE ATTENTION TO THE FOLLOWING PLAN:

Let Congress pass a general corporation law for all inter-state business, and the States adapt the same for all strictly State business. Let all persons who do a business that requires the labor of six persons or more, file proper articles of incorporation in the public record office of the county, in which the business may be done. Let the amount of cash capital actually and properly invested be stated. Allow the cash capitalist ten per cent. interest on his investment, and a fair salary for his personal attention to the concern, then require a proper book to be opened for labor contracts. Let all the employees sign a contract to work in a certain way, six months or one year, at the minimum wages, payable weekly. Let the books of the corporation be balanced every three months, and divide the

profits according to the skill and pay of the employes—the owners or cash capitalists to be considered an employe and to receive his share of the profits as others, according to his salary, which should be moderate and reasonable. The first three month's profits to be retained as security for performance of labor contract. This plan would stimulate every employe to work for the mutual interest of the whole concern, and strikes would be useless, undesirable, unpopular and cease to threaten and disturb the peace of the community, while from the very nature of the adjustment, cash capital, (for I call labor capital in fact,) and labor would strongly sympathize and become firm, friendly allies in common, successful and permanent interest. Why not the brick-makers and especially the "N. B. M. A." take this matter up, energetically?

Yours Very Truly,
J. W. CRARY, SR.

P. S.—I would make this law available at the option of investors, but if they did not accept of it and obey it, exempt the State from paying them damages by mobs.

J. W. C.

A Wet Time.

Editor Clay-Worker :

Enclosed please find draft for \$2.00 for CLAY-WORKER. Thought perhaps I had better send the \$2.00 while I had the cash, as I have gone out of the business for a week or two, while my brickyard has taken a vacation down the river for a week or, perhaps, a month. I am in search of a higher location. The fact of the case is, things have been slightly on the damp here in Belvidere for the past two months.

As for the brick business in Belvidere, can say for our yard, that we are right in the swim. About 150,000 of our brick started for Rockford last Friday morning by the way of the Kishwanke River. Brickmakers in this vicinity had the blues the early part of the month, but it has been raining so much for the past two weeks that they are beginning to look green. Even the hitchin' posts in our town are beginning to sprout and have prospects of becoming good sized trees if we can have about two months more damp weather. If I have not given you a clear idea of the weather in our part of the country, be kind enough to let me hear from you.

Wishing the CLAY-WORKER prosperity, which it surely deserves, we are

Truly Yours,

R. C. FRITZ & Co.

[The above communication was written just after the heavy spring rains. Its a little late now, but will vividly revive memories of that eventful season.—Ed.]

PAVEMENTS OF THE FUTURE.

In an instructive paper on the above subject, Mr. H. L. Weber, a well-known civil engineer, makes the following statements:

Knowing something of the lasting properties of a vitrified paving brick, we come to some of the other advantages of this material; but before going further let us call your attention to the fact that vitrified paving brick is but a few years old, and that a good many miles of streets have been paved with many kinds of brick, good, bad and indifferent, during the past eighteen years, which is about the length of time brick pavements have been in use in this country. These eighteen years have perfected the vitrified paving brick, which can now be said to be past the experimental stage. It is certainly the coming material for paving our city and village streets, as well as our country roads.

Its redeeming features are many, and I will endeavor to give them to you in a short and explicit a manner as possible. The vitrified brick pavement is not as dusty as the asphalt, which is a great objection to the latter pavement. The brick pavement is certainly not as noisy as the asphalt, which is certainly a great objection to any pavement. Brick pavement is practically as smooth as asphalt, and will retain a smooth and even surface, which no other pavement does so satisfactorily as brick. It is easily repaired, and when necessary to take it up for the purpose of tapping or repairing sewers, water or gas-pipes, or for any other purpose, it can be done by ordinary workmen, while a limited number of skilled and high-priced workmen only can repair an asphalt pavement, and only then in certain kinds of weather.

It has been truly said that "the best pavement is the one most easily repaired." The necessary repairs to water and gas-pipes should convince every one of this fact.

Our cities and towns can construct

and maintain a vitrified brick street at a far less cost than any other kind of material, and that twelve years does not represent its average life, but that time will practically demonstrate that twenty-five years will more truly represent the average life of our modern brick streets

BRICK BEARING AN OLD DATE.

J. W. Kirkpatrick, who lives seven miles south of Indianapolis, in Perry township, while tearing out the foundation of the chimney of the old farm house on the place, found what is known as a "common slop brick" with the date 1778 indented in one side. About 1836 a man named Bush, from Madison, took up this land and built the house. It is believed that he brought the brick with him from Madison, but there is no surmise as to its previous history.—*News.*

NEW INVENTIONS.

The following is a list of patents appertaining to brick, tile, terra cotta, sewer pipe, pottery, etc., and the machinery used in their manufacture, issued since our last number:

- 479,640. Compound for Preserving Color of Finishing Brick. J. D. Graybill, Shreveport, La.
- 479,663. Brick Cutting Machine. H. A. Riggs, Plymouth, Ohio.
- 480,134. Brick Kiln. Wm. Radford, San Francisco, Cali.
- 480,253. Drying Kiln. Chas. J. Dion, St. Paul, Minn.
- 480,561. Brick Kiln. Simon Dewhirst, St. Joseph, Mo.
- 480,726. Brick Machine. Wm. Johnson, Armly, Leeds, Eng.
- 480,818. Hydraulic Brick Press. Julius J. Koch, St. Louis, Mo.
- 480,879. Brick. John L. Stevenson, Chicago, Ill.
- 480,912. Machine for Repressing Brick Wm. W. Wallace & R. C. Penfield Willoughby, Ohio.
- 480,935 & 480,936. Brick Kiln. Jas. W. Penfield, Willoughby, Ohio.
- 481,454. Brick Machine. Thos. T. Wood, St. Joseph, Mich.
- 481,700. Brick. Philip S. Loveridge, Knoxville, Pa.
- 481,756. Brick Pavement. John R. Haldeman, Normal, Ill.
- 482,248. Brick Machine. Howard Harlan, Renovo, Pa.
- 482,252. Brick Machine. Geo. T. Jacobs, Washington, D. C.

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T. A. RANDALL & CO.,

81 Massachusetts Ave. Indianapolis

EXHIBITION OF CLAY WORK.

The Columbian Exposition will afford abundant opportunity for the study of clay products. Special attention is being given to this branch of industry in many of the States, and we may expect exhibitions from all parts of the world. The profit from such work will come not alone through added knowledge in regard to manufactured products and designs, but also through the educational effect which this exhibition will have upon the people. People generally, are not familiar with the capabilities of clay work. The exhibition of what may be done will enlarge the markets. The people will know the capabilities of clay, the various uses to which it may be put, and by these means and through their general enlargement from viewing the grand exhibition, they will go home more ambitious, more thoughtful, fuller of information, and thus contribute not alone to their own benefit, but to that of the world at large. Clay work is capable of making quite an impression upon the people. The artistic and practical forms which may be given to clay make it a material highly suitable for exhibition purposes, and because of this practicability, it will thereby render to the manufacturer of clay work, a particular and lasting benefit. We trust all who are engaged in this work will do what they can to add to the value and interest of this department of

the Columbian Exposition. The various State officers have this matter in charge and all are anxious for practical and hearty support from manufacturers.

A PROSPEROUS COUNTRY.

Every man feels better when he knows that the aggregate results of any year or series of years show substantial prosperity on the whole. There may be individual instances of hard luck or reverses. Local causes may effect harvests in some localities, but when the aggregate harvest has been good the people have occasion to rejoice.

The Commissioner on Labor Statistics in New York, whose business it is to gather facts and tabulate them, has recently published the results of his investigation. He investigated 111 trades which give employment to 285,000 men. Of these, eighty-five show an annual increase of output and of wages, and the total average annual increase of wages is \$23.11 per man, while in fifty-one of the trades the average increase of wages is \$43.96 as between the years 1890 and 1891. This shows a healthful condition of affairs, but when supplemented by the report of the Congressional Committee, signed by every member, that during the year ending June 30, 1892, the average pay of wage-earners had increased while the average cost of living had decreased, we have reason to say that this is a prosperous country, notwithstanding the moanings of occasional dispeptics whose digestion is so out of order that everything sours on their stomach.

To these statistics may be added another class, indicating a prosperity never before known.

In the three years, ending June 30, 1892, deposits in the Savings Banks of New York had increased \$86,882,516. These represent the savings of 1,556,113 people of small means, and show an increase of depositors of 200,000 in three years.

In the West, the multiplication of Building and Loan Associations, the Savings Banks of the laboring people, show equal if not even greater prosperity, though we have not at hand the exact figures to show to what extent. No wonder the laboring men of Europe are flocking to our shores. The only wonder is, that any American can inveigh against such a country and take part with the Anarchists who come from abroad.

STRIKES AND THEIR REMEDIES.

The brains of Australia have taken up the question of strikes and their remedies. It was Australia who gave us our new election system. She devised and put into use a new system of land titles which will create as great a revolution in its way as did the election law. There appears to be an independence of thought, a thoroughness of action, and a freedom from restraint in the people of Australia, which develops splendid results. Recently there was organized a commission on strikes and they have issued their report, a large volume of about a thousand pages, which is in itself a veritable library of economics. It treats the subject in a manner so thorough, so intelligent that it cannot but move the world forward in dealing with this great problem. A strike in 1890, in New South Wales was disastrous in its results. It originated in the Sheep Shearing Union and grew until the coal miners of the colony and almost every other productive industry was involved. The result was a paralyzed state, almost equal to a civil war in its effects upon trade and living. This is a condition in which we are likely to find a parallel in our own future history; and, if we will, we may profit by observing the work of this Australian commission.

"The federation of labor and the counter-federation of employers," the report says, "is the characteristic feature of the labor question in the present epoch. A few years ago each union was an independent organization, though the sympathy between different trades was strong, and showed itself repeatedly in the form of subscriptions to assist other trades when their members were on a strike or were locked out. But now the union of men in trade has developed into a union of different trades and practical sympathy has taken the form of aiding the strike by striking also. * * * * The effect of this organization of labor has already been to draw all employers together."

It may be that the federation of labor and employes has grown to a greater extent in Australia than with us, though it is easy to see the tendency of the times in our own country. In the matter of remedy the report says: "No better method of dispersing the mists that surround a controversy of the sort under consideration can be found, than a friendly conference. A very large experience has shown that the difficulty is

often cleared up in this way and reduced to such dimensions as admit of a fairly satisfactory settlement. It is this experience which leads to the conclusion that the first thing to be done in order to permit the settlement of the labor dispute, is to try the effect of conciliation.

"The terms conciliation and arbitration are often employed somewhat vaguely as though they were interchangeable, and yet they really represent two distinct things. The function of any conciliation agency is to get the parties in the dispute to come to a common agreement, voluntarily, without any opinion being pronounced on the merits or any instruction given: The function of arbitration is to distinctly determine the merits and to give a positive decision to be abided by." Following along this line, a Board of Conciliation and Arbitration is suggested. Taking the less formal method of conciliation first, and carrying it as far as possible so that when conciliation fails in a complete solution of a problem, there is less of detail and less work generally connected with arbitration. The work of conciliation is a simplifying process. It narrows the field of dispute and brings the parties together.

It is suggested by this commission, that arbitration should be compulsory upon the demand of one party. It says: "No quarrels should be allowed to fester if either party were willing to accept a settlement by the State Tribunal. Industrial quarrels cannot continue without the risk of their growing to dangerous dimensions, and the State has the right in the public interest, to call upon all who are protected by the laws to conform to any provision the laws may establish for settling quarrels dangerous to the public peace." In regard to the matter of compulsion as to the award by a Board of Arbitration, this report says that compulsion is not necessary in the law, that there is practically no way of enforcement of such a decision. But that experience has shown that respect for public opinion has always been sufficient. "They can agree to a bond before going to arbitration that would give the right to sue a defaulter."

We have undertaken to give a little of the spirit of the work of this notable commission. The idea is conciliation which, in itself brings about in the proper spirit a knowledge of troublesome differences. There can be no question but that the general tendency

of the times is towards arbitration as a remedy for strikes. The labor question and the capital question is one clearly requiring the best light and the best intelligence of the best men.

STREET PAVEMENTS.

In time peoples' eyes will be opened on the asphalt question. An imitation has been fostered upon our people for many years. The history of the imitation is bad. Despite this record of failure, it still receives support through an apathetic public on one hand, and aggressive business methods on the other. It has been said by one who knows, that the expense of caring for asphalt pavements by the companies which put them down, has been something frightful, and were it not for their successes in securing new contracts there would be a reasonable certainty of embarrassment; however, they are pushing, aggressive, and are successful under a low order of municipal service. There can be no question but that brick pavement is altogether the most satisfactory street covering which may be used in this country at this time. There are no objections to brick pavement that are corrected by the use of asphalt, and because of the enduring quality of this material, the ease with which it may be repaired and renewed, it is certain to accrue to its general introduction in this country. The time will come when the cost of asphalt paving material will be counted. When a high grade of municipal organization will investigate and use the best paving material which is at hand. It is then that brick pavement will be fully recognized throughout this broad land. It is the natural outcome of a material possessed of inherent virtues. The cause of brick paving has been injured to some extent by bad laying and poor foundations, through an effort to cheapen it. It must be known that if people were wanting a particularly cheap pavement, they would not put down asphalt. No one should be so narrow, so anxious for business as to suggest cheap foundations or anything cheap which is not servicable, connected with the street covering. Cheapness in itself is not objectionable. Lack of servicable qualities is objectionable.

The memory of man goes not back to the time when brick pavements were not in use in Holland. However, the Dutch pavements while they are lasting

and altogether satisfactory in many ways, are laid on a sand foundation, hence, are not so even as those which are placed upon a more permanent bed. In some of the cities of the Old World one finds brick pavements laid on concrete and filled in with cement. It is in that form that the brick pavement appears at its best. While it may be necessary in some sections to lay brick on sand foundations, it should be understood by all that such a pavement will not be the best nor that it will be exactly even or uniform. With such an understanding before the pavement is laid, there need be no disappointment in the end, no false hopes built up, and hence nothing will happen which will discredit the full value of brick as a paving material. It should be understood as to just what manner of laying brick will bring about the best results, then if those interested determine upon other methods, they are not in a position to criticize. A bold course of this kind is sure to win.

EDITORIAL COMMENT.

It is sometimes a very difficult matter for an architect or superintendent to determine the exact line of distinction between a hard brick and a soft brick. An architect criticizes brick that are upon the ground, and the brick layer may be, feels aggrieved. The brick may be pretty close to the line, but he is disposed to think that it should be worked in. The architect sees it the other way, and there is a basis for a slight disagreement. A delicate position for the architect and an annoying one for the brick layer. There is a place where one may say that the brick is not soft or that it is not hard. One is inclined to see these things according to his own interest. It is only by properly adjusted machinery for testing the strength of brick, that a matter of this kind can be fully and accurately determined.

Labor Day was very generally observed throughout the United States on the 5th inst. by parades, music and speeches by the labor organizations of the country. Everywhere, the display was not only highly creditable to the organizations, but highly gratifying to every citizen who feels an interest in the welfare of that portion of the toiling millions, who have thus combined for their protection and improvement. They were all well

dressed, and looked as if well fed, presenting an appearance of prosperity not to be seen in any other country. Though they represent only a small per cent. of the wage earners and working men of the country, they have the hearty sympathy of all good men in every effort to better their conditions which is not at the expense of brother laboring men, who have an equal right to the good places and good wages, which the conditions of our country makes so numerous and inviting that the millions from Foreign lands are flocking here to enjoy.

The presidential campaign is on now, and as the days grow cooler politics grow hotter. Let it wax hot but let every man keep cool. Your neighbor over the way may seem stubbornly joined to his party. Now the only way to keep cool towards him is to stretch your mantle of charity sufficiently to allow that he has just as much interest in the prosperity of the country as you have and seeks to perpetuate it as earnestly as you do, though he may differ with you. You may tell him why you think your policy is the better, but you must receive good-naturedly his reasons for not agreeing with you. Be sure of one thing—this country is not going to the bow-wows, no matter who is president. Keep sweet.

British vessels passing through our "Soo" Canal pay toll now, just as the Canadian government has been tolling our ships going through their "Welland" canal. It is very well when you are about to do a mean thing to look around and see if the other fellow can not go and do likewise. When Canada becomes one of the United States there will be an end to this sort of business.

It is not probable that any quarantine or other sanitary precautions can entirely prevent the coming of the Asiatic cholera both to our shores and our towns and rural districts, but personal and domestic and municipal cleanliness can materially effect its ravages, but more than everything else cheerfulness and a straight forward attention to business, with a proper regard to wholesome food will ward it off. Least of all let there be what is called "dieting." Eat as usual unless you usually eat unwholesome food, and work as usual unless you usually work too hard. But working too little and dodging around

to evade the cholera is much more dangerous than over-work, as starving is more dangerous than over-eating.

On page 230, under the caption "Brick Bonds," we give some illustrations of English and Flemish bonds in connection with brick work, and commend a study of the diagrams and the descriptions to those interested in the cause of good building. There is a growing tendency among all our mechanics, to draw from the wider fields of experience, information for the benefit of our own structures. And in connection with methods not common to us, we think some benefit may be derived. It may not be so much in the actual practical use of these identical bonds, but in modifications and added knowledge and thoughtfulness which the contemplation of this work may bring about in connection with brick building.

The great strikes of the summer are "off." It would be interesting to ascertain who has been benefitted by them, and in what way and to what extent. Many lives were lost, much property destroyed, and a vast sum in wages lost, but who gained anything by the struggle and strife is the question. Nevertheless they, or some strikes just like them, will recur whenever the walking delegate thinks it necessary to show his importance that way. In the remote future strikes will go out of fashion, because they are unprofitable to all concerned.

WHERE TO LOCATE NEW FACTORIES

Is the title of a 150 page Pamphlet recently published by the Passenger Department of the Illinois Central Railroad, and should be read by every Mechanic, Capitalist and Manufacturer. It describes in detail the manufacturing advantages of the principal cities and towns on the line of the Southern Division of the Illinois Central and the Louisville, New Orleans and Texas Railroads and indicates the character and amount of substantial aid each city or town is willing to contribute. It furnishes conclusive proof that the South possesses advantages for the establishment of every kind of factory working wool, cotton, wood or clay. For a free copy of this illustrated pamphlet address Mr. J. F. Merry, Assistant General Passenger Agent, I. C. R. R., Manchester, Iowa.

EDITORIAL NOTES and CLIPPINGS.

I. M. Depew's exact post-office address is desired.

A Tile factory will be built at Grundy Center, Ia.

A brick plant is to be established at Glouster, Ohio.

Little & Gardner are making brick at West Pembroke, Me.

Robt. Henderson will engage in the brick business at Youngstown, Ohio.

Adrian, Mich., has begun the good work of paving her streets with brick.

The Black Granite Brick Company, Pittsburg, Pa., has been incorporated.

The Yale Brick Company, Berlin, Conn., are putting in a Boyd dry press.

The Huyett & Smith Mfg Co. appear with a new and catchy Ad. on page 220.

A gold brick worth \$230,000 will be exhibited at the World's Fair by Montana.

Wm. Haas, Brazil, Ind., is thinking of putting up a brick manufactory near that city.

The Bowen Brick and Tile Co's works at Bowen, Ill., were burned Aug. 29. Uninsured.

The Akron Heating & Ventilating Co. has removed its factory from Akron to Barberton Ohio.

There was a \$2,500 fire at the brick works of E. S. Hacker & Sons, Brunswick, N. H., Aug. 18th.

Alex Reynolds, Reynoldville, Pa., will erect a large paving brick plant on his property at Red Bank.

The Rankin & Wolfe Brick and Tile Company, Tarkio, Mo., has been incorporated, capital \$100,000.

The fire fiend visited the brick works of Dr. Beshoar, at Trinidad, Colo., Aug. 16th, causing a \$1,500 loss.

The Industrial Land Development Company will establish large brick works near Mays Landing, N. J.

A. N. Forsyth has removed from Greenfield, Ind., to Gas City, Ind., where he will establish a brick factory.

Adams Bros. & Payne Brick Works at Lynchburg, Va., was burned Aug. 20th Loss \$20,000. Insurance \$10,000.

E. L. Faber, Glenwood, Va., is organizing a company to establish a \$50,000 paving brick plant in that vicinity.

The brick works of Malone & Gorham Toledo, O., were partially burned Aug. 19. Loss, \$2,500. Little insurance.

C. B. Oldfield, Norfolk, Va., is thinking of erecting a brick dryer and will be pleased to receive papers treating on the subject.

The Law Steel Hod, is the title of a neat little pamphlet issued by the Law Mfg Co., 611 St. Clair St., Toledo, O.,

THE CLAYWORKER.

THE OFFICIAL ORGAN OF THE NATIONAL BRICK MANUFACTURERS' ASSOCIATION OF THE UNITED STATES OF AMERICA.

VOL. XVIII.

INDIANAPOLIS, IND., OCTOBER, 1892.

No. 4

Written for the Clay-Worker.

THE CHATEAU OF MANTENON.

MOST of the chateaus of France are of stone. Stone was the material which could be taken out of the ground and be readily formed in the shapes required in building structures. A great deal of the stone of France is exceedingly soft when taken out of the quarry, so that by little physical effort it can be easily shaped to conform to the requirements of the architect and artist. However, in some instances we

find among the best structures of early times, a liberal use made of brick. In the Chateau which is presented herewith, we find brick work playing an important structural part. The stone is used decoratively, yet brick is used to secure color and general form, and the result, as we see in this photographic print, which is made from a chromatic plate, shows the color values or color qualities of brick as related to stone and other material. Just what is meant by color values may be illustrated by the flowers in the vases along the wall. While the

colors of the flowers do not show, the relative color values do show, thus it is in the brick work, the stone work and the slate that we have in this photograph, an exhibition of the color qualities or the color values as the different materials are related one to the other. The liberal use of stone in this structure illustrates clearly enough that brick was selected because of its artistic value rather than through absolute necessity. No advocate of brick building can hope to secure the use of brick as a building material excepting for good and suffi-



CHATEAU DE MANTENON—FACADE COTE DU PARC, PARIS, FRANCE.

cient reasons. In a country far removed from the brick market, the effort to secure the use of brick material when stone is at hand, would not be commensurate with results. Yet in this case it would be a good deal easier and quite as cheap to get stone as it would be to get brick building material.

We have said that stone in this structure was of a character to admit of its ready use in a decorative way, because it was soft, and for that reason readily fashioned into the forms which come to the mind of the artist. In our country we have no stone which lends itself so readily to the hand of the artist as does the stone of France. However, as far as enduring qualities are concerned, we have stone which is superior. On the other hand, our knowledge of the use of clay as a building and decorative material is such as to allow us to use clay products in the same artistic way, in the same decorative manner and with the same freedom as did the artists and architects of France in handling their soft stone.

Stone with them was as plastic to the mind as is clay to the hand of the American artist. It must be borne in mind that in order to get artistic work in brick or other forms of clay, that it must be done by the artist. The artist must be the directing force. It must be his hand or his mind which acts directly upon the building material and hence produces artistic results. Handicraft is necessary. Handicraft is not enough. It is to the interest of every brickmaker in America that artistic talent be developed looking to the handling of clay products. The material which best lends itself to the hand of the artist and the material which receives the most artistic handling, is that which will receive the best patronage from the people. There is nothing which pays so well as the artistic handling of any natural material. It adds more value for the investment than can be secured in any other way. We can illustrate this when we bear in mind that raw materials of any kind does not cost relatively a great deal of money. Yet when put into attractive forms through the direction of artistic minds, it takes to itself the value proportionally larger in excess to the difference in actual investment. The large profits are represented by the difference between the mere handicraft, mere constructional form and artistic form.

American architecture will develop it-

self through the medium of clay. There can be no doubt about this. The tendency in stone work is in the wrong direction. Stone carving is done by stone cutters, not by stone artists. Artists in stone work are rare. In fact, the difference between a stone cutter and a sculptor in doing decorative architectural work is not recognized in the stone yards of America. A man who is clever with his tools and can get decorative work, has the opportunity of doing the work which should otherwise be assigned to an artist. In nearly every terra cotta manufactory of America, one finds modelers who are possessed of the artistic training and artistic enthusiasm, which is necessary to the highest results. The best work from an artistic standpoint, which has been done in America during recent years, has come from the clay-worker. We have Frenchman, Italians, Germans and Englishmen, in whom have been cultivated the artistic instinct and who have directed their attention to the modeling of clay in artistic forms, and because of the acquisition of such talent in this field, the statement as made is unquestionably true.

We have stated before that the stone work of France as handled, is terra cotta construction. Anything which is built in stone in that section can be constructed in terra cotta. It is terra cotta construction rather than stone. The stone is in small pieces because of its structural qualities, and for that reason the forms which are shown in this photograph, all lend themselves naturally and properly to terra cotta forms.

LATE BEGINNERS.

Cato did not learn Greek until he was 80 years of age, nor did Plutarch begin the study of Latin until well nigh as old. Theophrastus began his greatest work at 90, and Colbert, the famous French statesman, returned at the age of 60 to the study of law. Sir Henry Speilman did not begin studying the science until he was 50 years of age, and yet had accomplished much before he died, and in France a certain Marquis de St. Aulaire did not discover that he was a poet until he had passed his 70th year. Socrates learned to play on musical instruments in his old age, and an Italian writer, Ludovico Modaldesco by name, wrote the memoirs of his times when he had attained the extraordinary age of 115 years.—*Harper's Young People*

Written for the Clay-Worker.

HINTS ON BRICKMAKING.

No. 68.

BY R. BRICK.

ECONOMICAL CONSTRUCTION OF BRICK WORKS CONTINUED.

IN the preceding chapters on this subject, the selection of location, machinery, etc., has been considered, also buildings, and drying of brick by sunshine first season, and construction of artificial dryers, and burning in temporary walls. This brings us to the consideration of kilns of a permanent character, for burning the product. The first point in this kiln is, it must be a successful kiln; second, it must be durable in all its parts; third, it must burn cheap fuel and utilize more than one kind of fuel; fourth, it must be simple in principle, and readily controlled while in operation, and economical in the labor required to operate it; and last, but not least, it must be built at reasonable cost. There are up-draft, down-draft, up and down-draft, and continuous kilns. There are up-draft kilns without crowns; these are called open top; these may be simply walls with fire openings through them on the same plan as the temporary casing described in a previous chapter, or the same walls with furnaces and heat chambers outside. Then there is the kiln with furnaces as described, with crown top kiln, for burning of building brick in large quantities, where capital is limited. It will not be necessary to consider the construction of down-draft or continuous kilns.

For burning fire brick, pottery, sewer pipe, etc., the down-draft kilns have advantages over the up-draft kilns, but for the purposes we are considering, the other kilns are available.

The first point mentioned is, the kiln must be successful. What should a kiln do? It should burn from ninety to one hundred per cent. hard brick, without overburning any of the ware. It should consume either wood, coal, coal screenings, oil or gas for fuel. Only one fireman should be required for each 200,000 bricks. There are three or four kilns of this class that have been patented and are in successful operation in this country; most of these are familiar to the readers of the CLAY-WORKER, and the proprietors of each will furnish all specific information desired on application. The very best plan is to visit works where these kilns are in daily use and

have been for years, see the product, and get all the points concerning them from the brickmaker using them, then determine which of the different kilns best suits your purposes and circumstances. Whatever kiln you may select, build it in accordance with plans and specifications furnished. Don't attempt to curtail, and, above all, don't try to *improve* on the plans. So many men look at a kiln, or the plans, and imagine they know more about it than the patentee who has given it years of study and experiment. Stick to the plans. Then build it well. Use fire brick wherever needed, and make heavy and permanent; wall should be from thirty inches to four feet at base to sixteen or twenty inches at the top. Put hard brick in foundations and on the line where exposed to frost and moisture, also all headers should be hard brick and walls thoroughly slushed with mortar, and held in place by heavy rods and timbers. In the construction of these walls the damaged and washed brick that have been set aside during the first season can be used. The fire bricks and castings are the only materials necessary to buy in building these rough walls. If you have two good bricklayers, one for each corner, to keep the "leads" plumb and straight, a few "brickyard" bricklayers can be utilized to good advantage, backing up and filling in the heavy walls. In this way the cost of construction can be reduced to a minimum. Fire brick work should be done by good workmen and laid with thin joints of mortar, arches turned true to the center, the bricks matching perfectly on the under side of arch; no lips or *cat-stairs* should appear. At the finish or apex of the crown, the key course should be a close fit at top and bottom side of the brick.

The location of kilns with reference to dryer and railroad tracks has been discussed in a previous chapter. Raise the kiln ground, or bottom, at least 12 or 18 inches above the general level. Protect it by ditches from surface water, also have underground ditches to drain furnaces and fuel ground. Fuel space in front of furnaces should be paved to save fuel and keep the firemen dry and solid under foot at least. There should be a side shed to protect firemen and fuel from rain and snow.

You may not be able to build more than one or two kilns the first fall and winter, if not they can be used as much as possible the second season, and occasionally a kiln can be burned in a temporary wall.

For a daily output of 25,000 bricks you should have three kilns, of at least 30,000 capacity each. This would give two weeks to fill, two weeks to burn and cool, and two weeks to unload each kiln. While No. 1 kiln is filling, No. 2 is burning and cooling and No. 3 is unloading.

During the second season, during September, October and November, the third clamp can be built. Then you will



I. L. STILES, PRESIDENT I. L. STILES & SON'S BRICK MFG. CO.,
NORTH HAVEN, CONN.

have a complete plant, equipped with power and machinery, etc., for making the brick, dryers to dry them independent of sunshine or rain, snow or frost, enabling you to turn out six millions to seven millions of bricks per year, and kilns that will burn them well and economically, saving labor of building and removing temporary walls, as well as a great deal of expense for labor in burning.

In our next article will be discussed the management of plants in detail.

Don't forget the CLAY-WORKER costs only \$2.00 a year IF PAID IN ADVANCE. Now is the time to subscribe.

Written for the Clay-Worker.

PRACTICAL POINTS ABOUT PAVING BRICK.

Sixth Paper.

BY D. W. STOOKEY.

VITRIFIED PAVING BRICK.

MUCH has been said and written about vitrified brick, and the term "Vitrified Pavers" is one that has been often used in connection with the subject of paving brick. A careful examination of the meaning of the term vitrified will readily show that the above use of the word is in a very loose sense and must be given at least as much liberty as the freedom allotted to writers of verse under the head of "Poetic License." Vitreous means glassy, and is a term that is synonymous with glass.

Glass is a specific substance, made, according to Webster, "by fusing sand with fixed alkalies." A more exact chemical definition of glass may be given as a fused compound of the silicates of the alkaline metals and those of the alkaline earths.

Thus crown or window glass and plate glass is composed of silicates of sodium and calcium.

Bohemian glass of silicates of potassium and calcium.

Flint glass or crystal of silicates of potassium and lead, and common green bottle glass of silicates of sodium, calcium, iron and aluminium.

In order to manufacture vitrified brick it may be readily seen from the above that it is necessary to use material largely composed of such ingredients as will vitrify or make glass.

Any one at all familiar with the manufacture of paving brick knows that the clays in general use for this purpose are not at all adapted to the manufacture of glass even in its most crude and imperfect forms.

It is possible that many of the clays used do contain a small amount of ingredients in the conditions necessary to the formation of glass, but the probabilities are that the quantities are very limited.

The materials of which glass is made must be fused before they will form glass, that is, before they will become vitrified. On the other hand, it is well

known that clays suitable for the manufacture of paving brick must contain such constituent parts as will enable them, as a whole, to resist fusion, in order that the brick may retain their form while being burned.

The presence of the amount of refractory material necessary to the retention of their form and to resist the tendency to melt under the heat of the kiln precludes the possibility of their becoming vitreous to any great extent. A portion of the constituent parts of the brick may assume the vitreous condition while the temperature is high enough.

The quantity of glass formed or the amount of vitrification necessary depends upon the amount of the proper materials existing in the clay and the favorableness of the conditions under which they are found. These conditions depend upon the proximity of the various parts, their degree of pulverization and the states in which they exist chemically. Probably a great majority of the clays contain the elements that enter into the composition of some kind of glass, but only a few of them contain any great amount in conditions that will vitrify while burning in the kiln. Enough silica is in almost any clay to transform the whole brick into glass, but it does not exist under forms that are available or that can be acted upon by the other ingredients of glass, and these other elements do not exist in the clay in sufficient quantities to engage all of the silica in the formation of glass. If these other parts do occur in the clay they may already be resting satisfied in the embrace of some elements for which they have an affinity that is stronger than that for the silica.

Analyses of various clays show the presence of varying quantities of sodium, calcium and potassium. In a great many instances the amount is sufficient to vitrify a considerable amount of the brick, but unfortunately they are not found in available conditions. They are seldom found free but are combined with something else that prevents their uniting with silica to form glass. Thus it appears that although the materials that enter into the composition of glass and that may produce vitrification, may, and often do, exist in brick, it does not follow that vitrification will take place. Simply because nearly all clays may contain the elements that are necessary to vitrification, and because the temperature reached in the kiln is suffi-

ciently high it does not certainly assure that the brick will be vitrified.

The laws of chemistry are as exacting as mathematics, and like those of the Medes and Persians, they do not change. Before any particular chemical action will take place all things must be ready, each element must exist in a specific form, the quantity must be exactly that required by the laws under which they act, the temperature must reach a certain point and the substances must be brought practically into contact.

The general use of the term vitrified, as applied to hard burned brick, has probably arisen out of a confusion of the terms melted or fused and vitrified. All clays contain more or less of fusible materials, and, in a majority of clays, the greater part is fusible within the range of temperatures reached in burning paving brick. In burning brick as hard as is customary, a considerable amount of this fusible material is reduced, and in the melted or viscous state it fills the minute spaces between the particles that are not fused, and by cementing all together forms a more or less homogeneous mass. All very hard burned brick are not vitrified. They may be fused to a point bordering on fluidity and become practically impervious to water after cooling; may show approximately a plane fracture, which is a characteristic of glass, and yet not be vitrified. The impervious, homogeneous condition in which they appear is owing to the fused condition and not to vitrification.

Brick made of mixed clays that contain and non-fusible fusible ingredients cannot be wholly vitrified. They may be fused and in a limited degree vitrification may take place, and an impervious condition result, but imperviousness is not a sure indication of vitrification. On the contrary, a fused brick may be impervious without the least degree of vitrification.

From the foregoing the conclusions may be drawn that it is impossible to make brick wholly vitrified of such clays as are being used in the manufacture of paving brick, that all very hard burned brick may be, and probably are, vitrified in a greater or less degree, that imperviousness is not an infallible indication of vitrification, that impervious brick may be wholly devoid of vitrification, and that vitrification is not one of the essential characteristics of a good paving brick.

A BRICK.

I am a brick, that's what I am,
There's nothing 'bout me that looks like a sham,
I'm hard and I'm tough,
And a little bit rough,
I'm a brick that's what I am.

I'm ancient, that's what I am,
Mixed up with bad clay, so the story ran,
After tramping and shaking,
The sun did the baking;
I'm ancient, that's what I am.

I'm humble, that's what I am,
As I bow my proud head to be trodden by man,
And prostrate I lay,
In a city road way;
I'm humble, that's what I am.

But I'm useful, that's what I am,
I challenge the world, to dispute it who can,
An ornament too
Of beautiful hue;
And I'm useful that's what I am.

—E. M. Cox.

"YOU CANT TEACH ME 'NOTHING.'"

A BRICKMAKER THROWS AWAY \$500 A YEAR.

THE intelligent remark above quoted was made to us recently when we called upon a country brickmaker. In other words this worthy member of the craft had finished his education. Like Alexander, he was in the habit of sitting down—possibly on his beloved brick—and weeping that he had no new worlds to conquer. Science, rich with the spoils of time, had long since closed to him her ample page; education had nothing new to unfold. This man, we thought, not only keeps pace with the times, he is abreast of them. We craved permission to have a look at his yard, and, with great equanimity, it was granted us. A peep over the gate was enough to make a modest man turn green with envy. Here, indeed, was the one typical yard for which our eyes had long looked in vain, the promised land of which at last we were to get a glimpse.

"You can't teach me nothing," said the good man, forgetting that he was condemning himself out of his own mouth; for is it not written in the school-book that two negatives make a positive? But we didn't want to teach him elementary principles of grammar and English composition. They, indeed, are non-essential to a brickmaker; but we could have put him up to a wrinkle or two in his own trade. Wrinkles are worth money nowadays, and, so far as this brickmaker was concerned, we could have told him how to put an additional hundred pounds a year into his pocket if he had wished.

Our inspection of this yard was full of genuine surprises. Everything was at least half-a-century behind time.

The brickfield certainly possessed some of the very best yellow plastic clay that we have ever seen; but in "getting" it the loam and topsoil had been allowed to fall over and mingle. Beneath the yellow clay was a six-foot stratum of close-grained yet friable marl. This he was not troubling about at all. It was overspread with rubbish of all kinds. Instead of digging it and making it into bricks by means of simple machinery, he was in some places merely using it as a tip for clinker and other kiln refuse. It had not occurred to him to use this marl and then make the ground good to grow roots upon. His kilns were of the most antique pattern of clamp, and full of cracks, through which the heat escaped. His burner knew enough about the business to turn out, perhaps, 60 per cent. of good ringing bricks; the rest, judging from the untidy stacks of them about, were either too soft or of the "black hetter" type.

Untidiness was the most pronounced feature in the yard. Wheelbarrows and sundry implements that were laying about made confusion worse confounded. The hand-molds appeared to be worn out for the most part, and there was scarcely a well-shaped brick to be seen. The one-horse pug was of such a description that the clay was only partially mixed. No care was exercised in picking out the stones and ochre lumps, and there were no crushers. The sand was being dried upon a waste piece of ground, and appeared to be well mixed with dust and small stones. The open hacks were weedy and ill-drained, and a few old sugar mats did duty for covers. Another lamentable fact was that several of his helpers were women. We do not say this in disparagement of the sex, for they can do some work equally well as men, but these women looked overworked and underpaid.

This brickmaker, who had never felt the quickening influences of competition or ever read a technical journal, despised machinery, and actually believed that he had a most perfect system of brickmaking, and was doing a "grand" business. Where ignorance is bliss, 'tis

indeed folly to be wise.—*The British Clay-Worker.*

A REMARKABLE LIFE WORK.

IN an interesting article under the above caption, the Lancaster, Pa., *Daily Examiner* says some very complimentary things of Mr. Henry Martin, a very familiar name to our readers. We present herewith an excellent portrait of Mr. Martin and give the following sketch of his life, culled from the article referred to.

Mr. Martin was born, sixty years ago, in Derbyshire, England, and was raised and educated at Staffordshire. At the



HENRY MARTIN, INVENTOR AND BUILDER OF BRICK MACHINERY, LANCASTER, PA.

age of thirteen years he left school and went to work with his father, who was a millwright and carpenter. He went into the largest brickyard then in England, remaining there until he was seventeen years old. Here it was that he gained his first knowledge of brick moulds, brickyard supplies, clay grinding and tempering machines, etc., and how well he turned this knowledge to account will appear later on.

At seventeen he entered a builders' establishment at Birmingham, England, remaining there three years and learning the carpenter trade. At twenty-one years he entered a more extensive build-

ers' establishment at Liverpool, and there he laid the foundation of his after success in life. Instead of idling away his evenings he took a course of instruction in his spare moments from instructors who were employed by the Young Men's Christian Association. These instructors taught drawing and mathematics, among other things, and young Martin became deeply interested in the two studies named—so deeply that he became an expert at architectural and mechanical drawing.

In 1858, with several companions, Mr. Martin left England and came to America. He went to Boston and worked for a time as a carpenter. Then he went to Hartford, Conn., where he married a brickmaker's daughter. When the war of the Rebellion broke out his wife died, leaving him with small children. Then he entered the Springfield armor, remaining there until the close of the war, and it was here that he made the models for the first good brickmaking machine that he ever constructed.

Leaving Springfield, the subject of this sketch went to New York and there associated himself with other parties in the manufacture of brick machines. The parties who were interested with him were also engaged in the commission and lumber business, and they went down in the panic of '67, owing Mr. Martin \$23,000 and leaving him with only \$10 in the world. He had pluck and brains, however, and that was about his only capital at that time. Through the aid of some personal friends he "got up and at it" again. He came to Lancaster, married his second wife and started in the manufacturing business again,

meeting with partial success. He left his family here and traveled, introducing his machines throughout the country. This he continued until 1870. Orders began to pour in at last and he made money. Then he began to buy property and opened a brickyard. He was on the road to success. The business grew rapidly, his real estate purchases proved good investments, and he kept on buying and building until today he is next to the largest tax payer in Lancaster.

Several years ago Mr. Martin felt that the business had grown too large for one man to attend to, and he organized

the Henry Martin Brick Machine Manufacturing Co., with a capital of \$150,000, all paid in. It is good deal of a "family" company, however, the only person belonging to it outside of Mr. Martin's immediate family being T. B. Holohan, Esq., solicitor for the company. The other members are Mr. Martin (whose interest goes to his daughter, Alice), Mr. Martin's sons—William R., George H., Herbert P. and James P., and Mr. M.'s son-in-law, Mr. Samuel Cross. The head of the concern had always thought that, when he reached the age of 60 years, if his income permitted it, he would retire. His income is certainly large enough to retire on, being more than \$10,000 per annum, but his services are so valuable to the company that they do not feel like giving them up, and he will remain with the company yet awhile.

He simply loves business and loves to be occupied. His is too active a brain to retire, and we don't believe he could retire if he tried. He is in the very prime of manhood, although sixty years old, being as bright mentally and as active physically as he ever was. May he be spared to us for long years to come. We need more Henry Martins.

HINTS FOR BOYS.

A gentleman advertised for a boy to assist him in his office, and nearly fifty applicants presented them before him. Out of the whole number he selected one and dismissed the rest.

"I should like to know," said a friend, "on what grounds you selected that boy, without a single recommendation?"

"You are mistaken," said the gentleman; "he has a great many. He wiped his feet when he came in, and closed the door after him, showing that he was careful; gave up his seat to that lame old man, showing that he was kind and thoughtful; he took off his cap when he came in, answered my questions promptly and respectfully, showing that he was polite and gentlemanly; he picked up a book that I had purposely laid upon the floor, and replaced it on the table, while all the rest stepped over it or shoved it aside; and he waited quietly for his turn, instead of pushing or crowding, showing that he was honest and orderly.

When I talked with him I noticed that his clothes were carefully brushed, his hair in nice order, and his teeth as white as milk; and when he wrote his name I noticed that his finger nails

were clean, instead of being tipped with jet, like that handsome little fellow's in the blue jacket. Don't you call these things letters of recommendation? I do; and I would give more for what I can tell about a boy by using my eyes ten minutes than all the letters of recommendation he can give me."

CHRISTOPHER COLUMBUS.

In this month, October, the four hundredth anniversary of the discovery of America will be celebrated throughout the country.

The celebration at the World's Fair Exposition buildings will doubtless be an imposing scene. It is well therefore, that we give a brief history of Columbus and his achievements, accompanied with what is supposed to be a correct likeness of this justly celebrated man.



Christopher Columbus was born in Genoa, in the year 1436. There is however some doubt as to the year of his birth, some maintain that his birth occurred in the year 1435 and others say 1446. He went to sea at the age of fourteen. He appeared in Lisbon in 1470, a tall, well formed, dignified personage. He married Felete Mouis de Palestrello, the daughter of a deceased Italian navigator. He occupied his time mostly in the construction of maps and charts and made several voyages to the coast of Africa and some of the neighboring islands.

In 1477 he made a voyage to the North of Iceland. He conceived the idea that by sailing westward he could reach Asia. He backed up his opinion with the discoveries of other mariners. To reach India by sea was the great problem of geography. Columbus suggested to John II of Portugal to solve the question by sailing westward. The King was favorably impressed with the probable success of the undertaking but the secret plottings of the Council defeated the sending out of an expedition.

Columbus then went to Spain in 1485, his only companion was his son Diego, his wife having died some time previously. He got an introduction to the King and Queen. They were favorably impressed with the proposition, but feared to undertake so great an enterprise. The queen Isabel became very much interested in Columbus' plans and offered to pledge her jewels to defray the expense of the expedition. But the King was prevailed on at length to defray the greater part of the expense. The articles of agreement were signed April 17, 1792 after seven years importuning and planning for the outfit. On Friday, August 3, the expedition set sail—from Palos, near Mogner on the Tinto; it consisted of three small vessels, two without decks, and 120 men. The only difficulty encountered was the mutinous tendency of the crews, which Columbus suppressed with extraordinary tact. He was withal a skillful sailor, and had helps that did not exist a few years before in the way of instruments—the compass and astrolabe had been but lately introduced.

Sitting on the top of his vessel at ten o'clock at night, October 11, 1492, gazing earnestly ahead he discovered moving lights upon the land. After hours of exciting suspense the day dawned and the shores of a lovely island was revealed—Guanahani, one of the Bahamas. He afterwards discovered Cuba and Hayti and called the inhabitants Indians, a name which they have retained to this day. Columbus believed to the day of his death that these islands were a part of Asia.

The discovery created a wonderful sensation in Europe. Columbus was received on his return with the greatest honors.

He next sailed from Cadiz with a fleet of seventeen ships and 1,500 men September 25, 1493, and discovered the Winward Isles, Jamaica, Porto Rico, etc. He founded a colony at Hispaniola, leaving his brother Bartholomew governor, he returned home. His third voyage was entered upon May 30, 1498.

Afterwards difficulties arose in the government of his colonies, charges were made against him and he was brought back to Spain in irons. He refuted the charges successfully but never recovered from the effects of the slanderous attacks made by those who should have been his friends.

He died at Seville, May 20, 1506, in full possession of all his faculties.—*The Drainage Journal.*

Written for the Clay-Worker.

CLAY FOR HEATING PURPOSES INSTEAD OF IRON---A POPULAR MISAPPREHENSION ON THE SUBJECT.

BY J. W. CRARY.

LARGE majority of people, though they may be of more than ordinary intelligence, are under the impression that clay, either burned or unburned, is not suitable for heating purposes. They say that clay is a poor conductor or radiator of heat, while iron is both quick and powerful. This is all true, but it is only half of the most

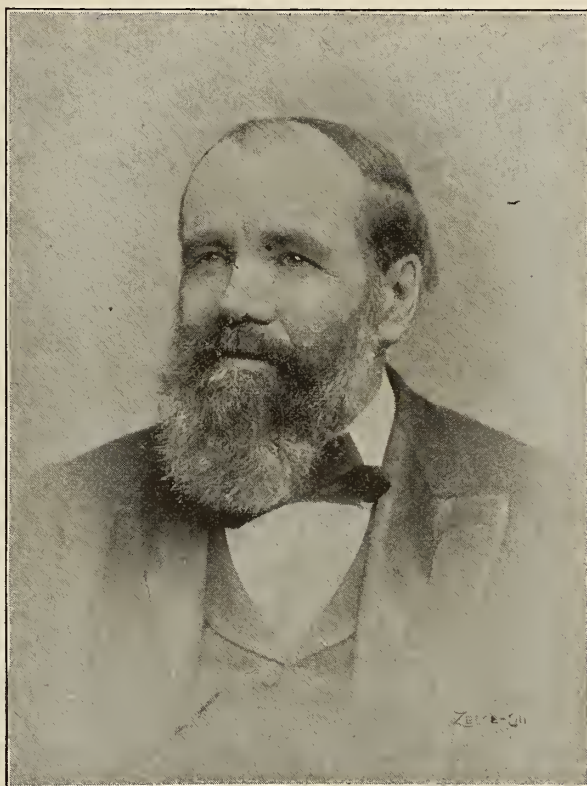
important part of the truth, which is the fact, that the clay can be heated to a given degree of heat, at as little cost of fuel as iron can, and will give off its heat at least five times longer. If we take, say a common brick weighing five pounds, and then five pounds of iron, with the same shape and heating surface of the brick, and put them together in a hot oven, we find that the iron will absorb the maximum heat of the oven, in one fifth of the time required to saturate the brick to the same degree of heat. Now if both be taken out and placed in separate open-top boxes, or barrels, the iron will raise a certain degree of heat in the barrel, five times quicker than the brick will do it, but the brick will retain the heat five times longer, and the average temperature in both barrels will be the same.

CLAY IS BETTER THAN IRON FOR HEATING HOUSES OR DRYERS.

Clay heaters for dwelling and public buildings, have been used with better results than had from iron heaters. They are more economical in construction, more so in economy of fuel, keep a steady and regular temperature, more durable, and, above all, the heat is much more healthful. When iron is heated above 212° F., it deoxidizes the air to a

damaging extent, while clay, will not do it, until at nearly a fusible heat. Besides, all clayworkers and burners know, that hot clay is a certain positive purifier of atmospheric air. All malarial atmosphere is neutralized or purified when in contact with hot clay.

An open front, clay stove or heater, with return, or up and down smoke flues, is one of the heat devices for healthy, economical heat in a dwelling, and nothing but the overruling interest of the iron workers, and the popular ignorance of the people about clay heat, has prevented every dwelling in the whole land from being heated by clay heaters or stoves.



THE LATE THOMAS MOULDING, CHICAGO, ILL.

If an open clay stove be placed in a room and a window near it be opened a little at the top, about all the befouled air from the breathing of inmates, will be forced out through the smoke flue, and though many persons may be in the room, no bad effect will be seen from poisoned air, (carbonic acid gas). This is done in *France* and *Germany*, and no people on the globe know more about the economy and health of housekeeping and warming.

My object in this article, was not to advertise clay heaters and stoves, but to show that clay, as a heating medium, is equal to, and in many respects, superior

to iron. I trust that our clayworkers will take up this subject and develop its possibilities, and great needs and merits. It may be hard on the "Medicine man," but mighty good for the man that has to pay him.

OBITUARY.

Death of Thomas Moulding.

IT is with deep regret that we must announce the death of Thomas Moulding, one of Chicago's best known and most highly esteemed citizens and brick manufacturers. No better tribute to Mr. Moulding's sterling qualities, of both head and heart, can be paid, than is contained in the following letter from his fellow craftsman, Mr. D. V. Purington, who, though a competitor in business, has sustained intimate and friendly relations with him for many years.

CHICAGO, Sept. 22, 1892.

My Dear Mr. Randall:

The train from Colorado this A. M. brought to this city all that was mortal of our dear friend, Thomas Moulding. His death was sudden, few outside his family having any knowledge of his illness. I do not know when any summons from this world has so filled my heart with sorrow, nor do I know a brick manufacturer in the United States whose loss will be as keenly felt as his. It has been my good fortune to have known him intimately for more than 20 years, and no man or woman could have enjoyed his acquaintance without being blessed thereby. We have not always agreed on questions of business policy, but Mr. Moulding was one of those rare men who did not allow minor differences to interfere with his personal friendships. As you know, in debates we some-

times waxed as warm as parliamentary practice would permit, but outside of the meeting there never was a shadow between us. He leaves behind him an untarnished record for honest, square, business dealings, an enviable reputation as a brick manufacturer, and a sorrowing family who can point with pride to the lessons of morality, temperance and philanthropy his life has taught. My heart goes out to them in sympathy and condolence for a loss that can never be repaired. Very truly yours,

D. V. PURINGTON.

Mr. Moulding was an active member of the Chicago Builders' and Traders' Exchange, which at a special meeting adopted the following resolution:

"In the 40 years from 1852 to 1892 Chicago has grown from a country village to a metropolis that is the wonder of the world. To have been during almost that entire period intimately connected with the building interests of such a city and to have been no inconsiderable part of such a growth and development is of itself a life's history, but when we can say of a man that in addition to an untarnished business record of 40 years and his efficient labors in the building up of material Chicago—he had always been closely connected with everything that has contributed to the moral, intellectual and philanthropic growth of the city,—and when we can add that for integrity, honesty of purpose and an intelligent conception of the future, and its necessities he had no superiors, that as a husband, father, friend and business associate his record is in the highest and noblest sense an ideal one, it seems to us that words can go no farther. Such a man was Thomas Moulding, and the Builders' and Traders' Exchange of the city he loved so dearly unites with his sorrowing family and friends in mourning the loss of a tender, loving husband, a steadfast friend, an honest man. By a unanimous vote they spread this memorial upon their records and direct the secretary to send a copy to the family of the deceased."

Written for the Clay-Worker

THE TRIALS OF A BRICKMAKER.

No. 4.

AND THE FLOODS CAME.

WE are told that ninety-three per cent. of all business men, sooner or later come to financial grief.

Just think of riding on that kind of a see-saw, in which ninety-three times out of a hundred you are at the bottom of the tip, and the other fellow at the top. Look back over your own life's experience in that line, and tell your fellow clayworker how often your end of the plank has come down with a thud, and what was the cause of your being sent down the toboggain slide of business.

We are also told by philosophers that "Cause and effect go hand in hand," and that the latter follows the former. Who gives a d—n for the cause of the water-spout, which a few years ago burst upon our Missouri hills and made mud-pies for us, of two hundred thousand unburned bricks. It was the effect upon our pockets in particular and our yard in general, that tipped down our end of the see-saw for the time being, and tipped up our calculations of profits for some time to come.

That yard was eight feet above the bed of the creek, which for four weeks

had refused to furnish the material of which to make steam in our boilers, and then all of a sudden it made up its mind, like the walking delegate, that it would rise in its power and show what it could do, and it did it.

Like the walking delegate, it subsided when it was no longer fed from outside sources, and, again, like that individual, it ruined everything with which it had come in contact.

True, "there is no loss without some gain," and about seventeen yards of clay was washed from the bank into the clay shed without expense, that would otherwise have cost 18 cents a yard to bring there. That was to the credit side of the business, but on the other hand, 27 yards of mud was sifted through two hundred and fifty thousand selected front brick, and it took six colored men a week to dig them out, and six years to sell them after they was dug out.

We wonder if in the days of Noah there was any such an institution as a brickyard.

Imagine a man watching the flood slowly rising about his brick hacks while they are gently settling into it. About the time the waters were rising into the arches of the kilns, he was rising to a place of safety on the top of the same; and the rain drops falling from above were accompanied by the tear drops welling up from below.

How plainly he is pictured in our imagination, as he sits with his elbows upon his knees, and his hands under his chin, watching the waters creep up towards the top of the kilns, until at last he is driven to the peak of the roof, and,——well, he is gone where the rest of us will follow if we are good brickmakers.

From that hereafter shore, if we are permitted to look back upon this, a good many of our craft will be able to see that many of the trials we have borne, we saddled upon ourselves, and in other cases we went too indifferent or lazy to shift them when we could readily have done so.

Some of us may not have money enough to build a water-proof shed over our whole yard, but if we cannot scoop together enough to put in a first-class system of sewers, we had better make an assignment to some one that can. If nature has failed to provide a natural basin to drain into, then we had better dig a well in which to turn our sewerage, and get a pump to force the water from the well into some other fellows pit.

Sometimes it comes handy to reverse the order of things, and "Do unto our neighbor" as he would like to do unto us.

We have read *somewhere* that a man should "build upon a rock and not upon the sand;" but the trouble in our case is, that our predecessor did a great deal of the building, and it would appear that he thought all good sand in sight might some day be wanted to make brick with, and as there was nothing else left but quicksand, he tried that.

We, therefore, occasionally realize that "The wicked stand upon slippery places," and, judging from the mouth of our sewer, it would appear as if the bowels of the earth were operating under the effect of a fearful physic.

The same thing can be seen at a certain spot in our clay bank, only in this case nature has made the sewer, and we, (by digging out the clay,) the basin. When we were unfortunate enough to tap that sewer, a stream of quicksand about like our arm poured out upon us, and the ingenuity of the ordinary man has failed to find a plug that would shut it up.

Plugging the holes in the sky through which the rain leaks, would be an easy job to the plugging of that quicksand hole.

To compensate for some of the evils which nature has planted, in her part of the make-up of our brickyard, we have the good fortune to possess a complete system of down draft kilns; (would say that they were Eudaly's if it were not for advertising him,) and just at present we wish to recommend all make of down draft kilns of that kind, and for two reasons:

In the first place, you are not apt to build any of them unless you have money enough to drain them well, and if well drained you are not apt to have the fires put out with a sharp shower. Again, their roof is a little less leaky than those which in our earlier brick-making days we erected over the old temporary clamp kiln. As our memory turns back to those *happy days*, we can again hear the sharp zip of the first drop of rain as it struck the red-hot platting on the kiln, and the increasing music as the shower developed, until it sounded like the popping of corn in the skillet, which was shaken so long ago over the old-fashioned fire-place of our "Grand dad." The rain clouds in the sky was soon increased by the steam clouds from the kiln, and when at last all clouds were

ready to break away, we could be certain that a couple of the top courses of the kiln were also ready to *break away*.

There are lots of times in this world when there is a good deal of difference between "Tweedle-de-de and Tweedle-de-dum." For hours we have walked down a mountain brook and never raised a trout until the rain drops began to patter, and then their dropping into the water seemed to stir up hungry fish and it was all "Tweedle-de-dee." How different, when about the first of November a cold rain caught us trying to get in the last of the season's hack of brick. It was then all "Tweedle-de-dum," and we felt like repeating some watery lines, which, while varying somewhat from

No fountain boils up, but the soot from the stack,
No gig on the drive but the wheelbarrow track,
When the rains cometh it sets all things afloat,
And the brickmaker rides in a *rubber-boot boat*.

Is it a wonder we like not to see
Clouds gather over the desolate lea,
Knowing full well that the drops as they fall
Will each roll up in a little mud ball,
And that the whole will very soon make
A slough of despond, a dark, muddy lake.

Oh! the rain, the miserable rain,
Here it comes, comes tumbling down again;
Putting the fires all out with the flood,
Covering the brick all over with mud;
Some one who lives in the sky cannot know
What a D—l of a time we're having below.

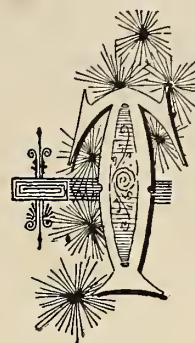
J. A. S.

PERTINENT POINTS.

Under the caption, "A Printer's notes on Advertising," in *Printers' Ink*, W. W. Pasko makes the following pertinent points:

BRICKYARD SKETCHES.

THE GRAPE CREEK CLAY WORKS.



HIS plant is located on the Chicago & Eastern Illinois and the Chicago & Illinois Coal Railways, about four miles from Danville, Ill. The works were established by the coal company in 1888 for the purpose of using the clay

from their coal mine. There are several varieties of clay, and at first they wasted their energy and means in experimental work, as such inexperienced organiza-



FROM KILN TO CARS—GRAPE CREEK BRICK WORKS.

those as in "The Beautiful Snow," would run about like this:—

Oh! the rain, the miserable rain,
Here it comes, comes tumbling down again,
Only a day since it fell before,
Will it forever continue to pour?
Some one who lives in the sky cannot know
What a D—l of a time we're having below.
Once in our lives, the fall of the rain
Acted like music on the nerves of our brain;
Peacefully patted our eyelids to rest,
Caused us to sleep the sleep of the blest;
The peace of those days from us now holds aloof,
For the rain patters down on a different roof.

The yard of our daddy where often we played
Was trimmed with a mower and not with a spade;
The drive freed from weeds with a different tool
Than a half-worn shoe on the hoof of a mule;
The bat that we dodged from our rollicking friend
Was not one as thrown by an Italian fiend.

The yard of our own, what a different lawn;
Not a green thing about but the owners so brawn

"Many millions of dollars are annually spent in advertising in this country. Much is thrown away, but a great deal which gives returns can be improved so that a still greater amount may be reaped. A prominent error is to use too many display lines, with too little space between. No one will read an advertisement half a column long in agate or nonpareil. The true way to get the best typographical effect is to shorten the reading matter as much as possible, have as few display lines as will answer, and employ the extra space in leading out and in giving greater size to the display. A notice, to be read easily must have ample space.

tions are very apt to do. Finally, Mr. Jos. Fairhall, whose portrait appeared on page 225 of September CLAY-WORKER, then vice-president of the Coal Co., concluded that there were too many "leaks" about the factory and determined to give the work his personal supervision and to that end removed his residence from Chicago to Grape Creek, a little village near the mines. Having no previous experience in the brick business, he at first found the task a difficult one, for there was no one connected with the factory having any practical knowledge of the work. He soon mastered the situation, though, and abandoning the idea of making press brick, devoted the plant entirely to paving

brick and blocks. An equipment for making these blocks was procured and an excellent paving block 4 x 5 x 12 was turned out. The demand for them was not so large as had been anticipated, so Mr. Fairhall turned his attention to paving brick of the ordinary size, and common building brick, and the works have been run to their full capacity, 33,000 a day, the past season. The quality of the brick is first-class, as demonstrated by tests made by the city engineer of Indianapolis, who made an exhaustive test of paving brick from fifteen manufactories, and awarded the Grape Creek first place for strength and durability. Mr. Fairhall has issued a neat little pamphlet giving the full text of the engineer's report of the tests and will lend a copy of it to any of our readers on request. Another and a very convincing evidence of the superiority of their paving brick is the fact that the factory cannot keep up with the demand. They have now orders booked that will keep them busy until March, '93, and have recently refused orders for upwards of twelve million brick. The clay is taken from above and below the coal beds and by a careful admixture and preparation a very dense, tough brick is produced. They are made by the stiff clay process, dried on a hot floor and burned in round down draft kilns with coal. Among the kilns is one monster that was erected from plans furnished by a Chicago Brick Works Engineer (?) at a cost of nearly \$10,000 but which they have never been able to burn successfully. It stands a mighty monument to the folly of building on a theory unsupported by practical knowledge.

The works employ 25 hands, all of whom began as common laborers and have learned what they know of clay work under Mr. Fairhall's direction. "We have no professional labor," said he to the writer, "but have some well trained men whom we pay an average of \$1.75 a day and who do their work thoroughly."

A GREAT CLAY WARE MANUFACTORY.

While in St. Louis recently, we were invited to visit the sewer pipe and fire clay works of Evens & Howard, which are located four miles out on the St. Louis & San Francisco and Missouri Pacific R. R.

Boarding a "Frisco" train at the Union station, a fifteen minute ride brought us to Howard's Station, where the

sight of acres of sewer pipe, groups of kilns, tall chimneys and great clouds of black smoke told more plainly than the brakeman's announcement that we had reached our destination. Making our way to the office, which is a handsome two story structure recently erected of material from their own kilns, we were cordially received by Mr. W. H. Handley, Supt. of the brick department, who courteously conducted us about the works which cover several acres of ground and represent an investment of a vast capital of money and brains. The main building is 200 x 310 feet, four stories high. The fourth story was added this spring and if the demand for

age more accurately than could be done with green clay. It is hauled from this artificial clay bank in carts by mules to wet pans, in which it is crushed and a certain per cent. of grog added. It is then shoveled on an elevator and carried to an upper floor. From the top of the elevator it is dropped or thrown in great chunks in a pile on the floor beneath, which largely answers the purpose of "wedging" or kneading, a slow and laborious process usually done by hand. After being molded and pressed by hand the ware is dried on the floors of the main building which is heated throughout by steam. They burn in both round and square down draft kilns,



MADE CLAY BANK—EVENS & HOWARD'S WORKS, ST. LOUIS.

their brick continues to increase, as it has the past season or two, they will have to add another story this fall. In the brick line their work is mostly devoted to fire brick, locomotive tiles, etc., but they are also making a great many buff and mottled building brick, which are molded by hand and repressed.

The clay is mined from a shaft several hundred feet in length, and dumped down the side of a hill, making a little mountain of clay, an artificial clay bank, as it were, and is allowed to lay exposed to the elements for several months. Mr. Handley stated that they weathered all of their clay, that it worked better and enabled them to calculate in advance the amount of shrink-

of which they have thirty or more, all of which are kept going the year through, as a rule. In this department they seem unusually successful, for they do not have sufficient waste to keep them in "grog," but have to burn a considerable amount of clay for this purpose. This they do by piling up a large quantity of clay, say six or eight feet high, beneath which is placed sufficient fuel to set fire to the mass. They touch a match and combustion does the rest. No additional firing being necessary.

Having but few minutes between trains we did not go through the sewer pipe department, which is the largest of the two. Our readers can form an estimate of the work turned out from the

fact that all told, they use over three hundred tons of clay a day. Their products include almost everything in the line of fire clay ware, all sizes of sewer and culvert pipe and they are now turning their attention to building brick and blocks which they can produce in almost any desired form or color.

Written for the Clay-Worker.

CONTINUOUS KILNS.

Third Paper.

BUT where capital is on hand in abundance, we see very well built and very well fitted brickyards

continuous kiln right away, and building goes on. Others try first a clamp kiln. What use is it to have large sheds for storing well dried clay for months in it for the dry process? That stuff is so fine and can be worked directly from the bank in the kilns, loaded and be sold for highest price as front brick, 40 to 60 dollars per thousand in the market. Go ahead, everything works fine. The clamp or patent kiln is opened, cars or barges are waiting for the precious material to be loaded. What's the matter? Only cracked brick, bats or mush come out of the kiln. Great indignation. Discharge the superintendent, fireman, the whole crew. Some

alty; don't listen to the kiln man, he is a crank. Continuous kilns are a total failure. That's the result. In some cases the company goes back to the first start, takes the advice of some old practical brickmaker. They yield to the slow starting of the brickyard again, putting aside machinery, kilns, etc., and making brick in the old way, having finally at last, some small returns, but don't touch that kiln again; it may do for a stable, and to store the old, useless machinery in. Are we to be surprised, that anyone in the neighborhood, watching the proceeding, shrinks from the idea of a continuous kiln?

The story of the failure of a continuous kiln spreads rapidly, like prairie fire over the country. Failures of old style brickyards is such a common thing, not worth mentioning. I know of one case, and there are surely more of them, where a continuous kiln, genuine Hoffman, was standing 10 years without being used. Brick were made by an old brickmaker all around the same and burnt in field kilns, till the proper man came, bought the whole plant for a trifle, repaired the old machinery, worked it, started the kiln, and has the best kiln in the market for over 12 years. I can give address for information. This is one sad but true story of the failure in continuous kilns.

[TO BE CONTINUED.]

Written for the Clay-Worker.

CHEMISTRY FOR CLAYWORKERS.

Paper No. 6.

THE preceding papers on this subject have been devoted mainly to the principles or laws of chemistry, and I have by no means gotten through with them. There is little or no inducement for a young man to study chemistry if we place before him nothing but page after page of dry laws and long and still drier tables to commit to memory, therefore I think we had better break through the conventional methods and make it as easy and entertaining as we can; so for the present we will lay aside notation, nomenclature, combining proportions, etc., and take them up again further on.

It puzzles many a clayworker of the old school to know where chemistry comes in in his trade; the old time brickmaker for instance, he digs his clay by hand, molds it by hand, dries it



GLIMPSE OF WORKS AS APPROACHED FROM HOWARDS STATION.

with continuous kilns (as well as with common kilns,) to be a failure. Let us consider only one case pictured after life. There is a boom. Brick are as high as 12 to 15 dollars in price.

Men who have never seen a brickyard, are convinced that that must be a fine investment. They happen to own a large tract of land, or, can buy it cheap, which, from some samples of dirt taken and tried by unexperienced men, seems to be fit to make a kind of a brick. The capitalist goes East or South, or North and buys, as he thinks, the best machine in the world, dry press in most cases is the favorite, perhaps Quaker, Automatic, Penfield or any other soft mud or stiff mud machine. They all can be bought and put up. Some decide to have a

strangers or employees risk to mention that the clay was not prepared well, or not mixed right or, is no clay at all. That's all nonsense. Let us commence again with new men. The same result. Now let us build a continuous kiln; that's the only thing. Put in trash and take out first-class ware. The continuous kiln has the same result. Now comes a stoppage. The brick went down in price to 8 or 6 dollars. The boom is all over. Some are discouraged, no wonder. The results of the clamp kiln or other non-continuous kilns are long forgotten. But the continuous kiln, the tall form of the chimney pointing to the merciless heavens, stands there yet as a warning sign. It is no good; it is the cause of all trouble; don't pay the roy-

by the sun, and burns it with wood in an old Dutch, or in a temporary kiln, and does not use an ounce of chemicals from beginning to the end of his operations; no disparagement of his methods is here intended; they are only thrown in to strengthen the picture. Now it is without doubt the honest conviction of our worthy friend that he runs his brickyard on the non-chemical principle, because none of his ingredients for making brick come from the drug-store; it might, however, be amusing, if not instructive to examine *a few* of the chemicals he uses. First, the clay he handles, it is composed of a half a dozen, or possibly a dozen of the elements named in the table I gave you in the August C. W.; the preponderating elements are silica and aluminum; these are very interesting elements, and the clayworker cannot know too much about them; he, however, does not deal with, or handle the elements themselves, but their oxides.

All clays are silicates of aluminum, which you will readily and rightly conclude is a combination of aluminum with silicic acid; you must not, however, infer that all silicates of aluminum are clay; many crystallized minerals are composed chiefly of this silicate, for example, feldspar, granite, porphyry and other primary; or unstratified rocks. These rocks, when crumbled by the action of the atmosphere and rain-water, or rather by the carbonic acid they (the water and the air) contain—are the sources of all clays. This really is the origin of clay—and to give you some idea of the change that takes place in these hard rocks when clay is made, it is necessary to give you the composition of unaltered feldspar, which is a silicate of aluminum and potassium symbolized thus, $\text{Al}_2\text{O}_3 \cdot 3\text{SiO}_2 + \text{K}_2\text{O} \cdot \text{SiO}_2$; this is in reality common alum with silicic acid in place of the sulphuric acid. I will give the composition of alum by and by. This feldspar you see contains silicate of potassium as well as silicate of aluminum, but is quite insoluble until acted upon by carbonic acid; this acid—looked upon by many as the most feeble of all acids, because almost any other acid will unseat it and take its place—I say this feeble acid displaces the silicic acid of the silicate of potash, and takes its place in the potash, forming carbonate of potash, which you all know is very soluble, then it only requires rain to dissolve and wash it out, and as the silicate of potash is thus

changed and dissolved out, but not dissolved, it is precipitated, or deposited somewhere. This is a very, very slow process for claymaking, but it is nature's way of doing it, if we accept the dictum of our most eminent chemists and geologists.

A deposit from such a decomposition as has just been given, would give us a bed of *kaolin*, which is practically pure clay and white; whereas if the rock undergoing such decomposition contains oxide of iron the deposited clay will be colored red, yellow, etc. The dark colored clays owe their shade to vegetable matter and bitumen.

There is an erroneous impression among practical clayworkers about clay, they think clay and alumina are one and the same thing, but they are not; clay is necessarily a silicate of aluminum.

Alumina or oxide of aluminum Al_2O_3 occurs native, forming the ruby and the sapphire, the colors of these stones are due to the presence of a trace of chromium in their composition. The hard mineral called corundum is another form of this oxide. Emery is an impure and crystallized variety of it; this you are aware is what we use for grinding and polishing hard substances, such as iron, steel, glass, etc.

You may make for yourself some pure oxide of aluminum, or alumina, by heating to redness some sulphate of aluminum, or some ammonia alum. The residue you have left will be the pure oxide in the form of a soft white powder, which is infusible at temperatures below that of the oxyhydrogen blow-pipe, in this flame it melts into a small clear globe which is extremely hard. The white powder just mentioned absorbs water very rapidly without combining with it; dry clay also possesses this property to a considerable extent so much so that clay tobacco pipes must have their ends glazed to prevent sticking to the lips and tongue.

I have given this short description of alumina here, to assist in removing the fallacy concerning the identity of clay and alumina.

We will now return to the clays, shales and slates, which are all silicates of aluminum. Shales and slates are clays that have been hardened by pressure and probably by heat also; they are very similar to clay in composition.

Clays, as you are well aware, vary in composition, therefore the *formula* for silicate of aluminum, $\text{Al}_2(\text{SiO}_3)_3$ is

not the formula of all clays, in fact, they are so variable in their construction, that no common formula can be given for them.

A word or two of explanation of the word *formula* is here necessary. Hitherto I have used the word "symbol" for both elements and compounds, but to be in correct form, I should have used the word "formula" when speaking of the symbols representing compound substances, and "symbol" for elements only.

Do not imagine there is a flaw in chemistry because you are told that clays are essentially silicates of aluminum, and in the same breath, that their composition varies so much that neither the formula $\text{Al}_2(\text{SiO}_3)_3$ nor any other common formula can be applied to them.

Of course, absolutely pure clay would be represented by the above formula. When pure, it is quite white, and is derived from colorless feldspar. You see it is the impurity of the clays that renders it impossible to give them a common formula, but these same impurities give to clay properties that fit it for the various purposes to which it is applied. Iron ores, and ores of other metals vary just in the same way, and these impurities *all* serve some useful end. Iron in clay, colors it all shades, from a light yellow to a dark red; in excess it would reduce the fusing point so low, that the heat of an ordinary kiln would melt it into a black glass. It is very remarkable that these two elements, iron and silicon, or rather their oxides, should flux each other, yet within certain limits be beneficial. Pig-iron for foundry and Bessemer steel making, must contain silicon in quantity suitable for each purpose;—two or three per cent. foundry iron may have a little wider margin than this—if this is much exceeded the iron is comparatively worthless for either purpose; being very fusible and extremely brittle when cold. Conversely a small percentage of iron serves to give tenacity to the bricks, or coarse ware made from such clays, and, as I have said above, gives the beautiful coloring to the bricks, but an excess of it is disastrous to them.

Iron is not the only fluxing element in clay, nor the most powerful one; potash, soda and lime are more active. Fire brick manufacturers are more concerned about fluxing elements than the building brick manufacturers; refractoriness being the essential feature of the fire brick, the clay retort, and the crucible.

The alkalies or fluxing elements are by no means desirable, even in the red or building brick, potash and soda being especially objectionable, on account of their exudation from the brick after it is put in the building, and frequently before it leaves the yard. This is a matter that my non-chemical brickmaking brethren cannot afford to ignore.

In the C. W. for Sept. I gave you the analyses of some Scotch fire bricks; allow me to offer you by way of variety the analysis of a brickmaker by Dr. Lancaster, the eminent London specialist. "The body operated on weighed 154.4 pounds, being about what is known as the "average sized man." During his lecture the doctor exhibited to his class 23.1 pounds of carbon to 2.2 pounds of lime, 22.3 oz. of phosphorus, and about 1 oz. each of sodium (salt), iron, potassium, magnesium and silicon. All of these different minerals he had extracted from the body of that one man! But that was not all. Besides the above "solid residue" "Professor Lancaster estimated that there were 5595 cu. ft. of oxygen, weighing 121 lbs.; 105,900 cu. ft. of hydrogen, weighing 15.4 lbs., besides 52 cu. ft. of nitrogen in that man's body! All these elements were combined in the following: 121 lbs. water, 16.5 lbs. of gelatine, 1.32 lbs. of fat, 8.8 lbs. of fibrin and albumen and 7.7 lbs. of phosphate of lime and other minerals!" — *Phila. Press*.

Either the Press, or Prof. Lancaster has gone a little astray with the numbers for the quantities of oxygen and hydrogen. If you chose to take my weights and measures for those given by the Press you will find them much nearer the mark. If you read it thus. There were 1,243 cu. ft. of oxygen weighing 111 lbs. and 2,340 cu. ft. of hydrogen weighing 13 lbs. besides 52 cu. ft. of nitrogen in that man's body; you will find it agrees much better in summing up.

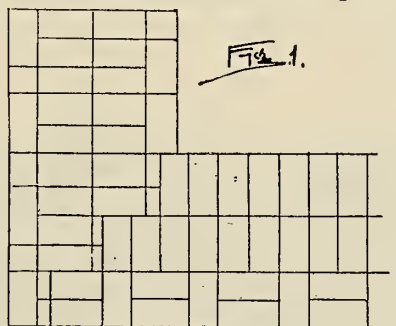
This is no criticism on Prof Lancaster, because I feel quite sure the Dr. never sent out those figures. I am afraid, nay I feel certain, that the printers had a hand in the blunder, for in looking over my own article in the Sept. issue I find the small o substituted for the capital O in some of the symbols. This seems a trifling matter, but it changes my carbonic acid into cobalt, making the formula of carbonate of calcium read, cobalt of calcium, and I am not aware of any such substance existing.

WM. WAPLINGTON.

Written for the Clay-Worker,

BONDS IN BRICK WORK.

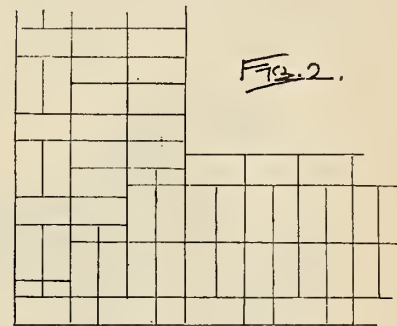
IN the last number of this magazine illustrations were given of English and Flemish bonds, but since that time the writer has been asked, by a very competent bricklayer, how thick the walls could be conveniently laid and preserve the bond inside and out? It was said in the last number that we did not pretend to give all the details connected with a thing of this kind, but the thought which would lead one to understand what was presented would also suggest further development of the plan of the English and Flemish bond. In order that there may be no misunderstanding in regard to this, however, Fig. 1 and Fig. 2 present a complete and finished corner of two courses of a Flemish bond wall three bricks in thickness. Fig. 1, we will say, in the bottom course, and Fig. 2 the one which comes next above it and so on up. The



closers are shown as coming in the corners, one showing on each wall. The closer with joint is hidden on the inside corner. However, the principle of using closers is the same, whether it be on the inside wall or on the outside. It is simply necessary to have joints covered by the middle of the brick. To do this, the brick must be split into the closer form.

The great advantage in the use of the Flemish or English bond is, that it is necessary to lay up the full width of the wall at once. It is well known that where one takes a brick and merely covers the end with mortar and does not undertake to slush the center of the wall, that there is a good proportion of the brick which is not touched by mortar or is no way bonded one into the other. The ideal way of laying brick, of course, is to have it entirely surrounded by mortar, excepting on its outside exposed face. It is well known that this seldom happens where brick is laid up with ordinary American bond where the work is tied together by six or seven courses.

In laying up a 12-inch wall it is well known that the outside course is carried all the way up from one bond to the next, and that the middle course is pushed up against the outside without mortar getting in between, and that there is then a large space between the middle course of brick and the inside course. It is carried up full height between the bonds and the center slushing and all it gets is when the last course is laid on the inside next to the bond course. Thus we have a wall in which a large part of the surface of the brick is laid dry without mortar. Any form of laying brick which will obviate this and make it necessary to lay up the full width of the wall at once, would for this reason, if no other, be of a decided advantage. No disadvantage which a Flemish or English bond may have and which may naturally present itself, is yet to be considered with that of having bricks laid up without a sufficiency of



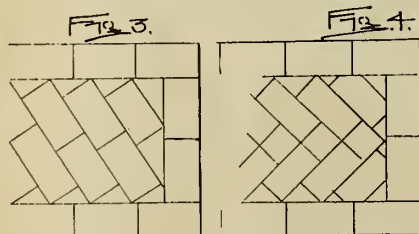
mortar. This evil is one so great that an architect need not expect to have the work properly done unless he has a building of such size, and compensation of such amount, as to justify him to have a superintendent on the wall at all times.

The bricklayer really does not lay brick in the way which is so common, through intentional wrong. The condition of wrong intention is past. This sort of thing had its origin in a desire to save mortar and in an unjust and willful desire to swindle some body, but it has grown past that state and it is now a part of his education. The journeyman bricklayer, foreman and boss are so imbued with this, that they naturally do it, but without malice or the idea of doing one harm. The way of getting around this is to devise a bond or method of laying the brick which will make it necessary to lay up the full width of the wall at once. In this is the advantage of the Flemish or English bond.

Fig. 3 and 4 represent bonds in brick

work that no one need imitate. There would be no advantage for us to do brick in this way. It is to be noticed that the outside course is laid up in the ordinary way and that the spaces between are filled with bricks laid diagonally or angle-wise, with the direction reversed each course. There would be a temptation in doing this to lay up the outside courses and dump in the brick in a very irregular way, and to prevent this, a great deal of attention from the foreman and others would be required. It might be that a good wall could be laid up in this way, as a good wall could be laid up in other ways, but the temptation to do differently is extraordinarily strong, and as it presents no other advantages and is only suited to very thick walls, there is no reason for its adoption.

Fig. 4 is what is called a herringbone bond. There the center half bricks are used, but the hollow spaces are still prevalent and all the disadvantages which apply to the Rake bond of Fig. 3, are



present in the Herringbone bond of Fig. 4.

Perfect bricklaying, or ideal bricklaying, always redounds to the advantage of the brickmaker. Anything which adds to the general reputation of brick walls adds to the general profit of the brickmaker. It creates increased confidence in the product and thereby brings about an increased use.

REMINISCENT.

THE art of brickmaking is supposed to have originated in ancient times with the powerful races found in Egypt, Chaldea, and China, in the Old World, and in Mexico and Peru in the New. The ruins of buildings and tombs left in these countries testify that they were skilful builders. Rawlinson states that the dimensions of bricks baked by the Chaldeans were $11\frac{1}{2}$ inches square, and $2\frac{1}{2}$ inches thick, and those of the later date 13 inches square, and three inches thick. All are familiar with the Egyptian method of tempering clay with a stick and drying in the sun, three thousand years ago. Compare the

ancient method with the practice at the present time in any small town in this country or in U. S. A. where bricks are made, there pug mills will be found in operation which are only a combination of several sticks and a mule; and green bricks are still dried in the sun, the same as was practiced by the ancients, showing little advance in three thousand years.

The first bricks manufactured and burned in the States were at New Haven, Conn., in the year 1650; and the next city to claim early manufacture is Philadelphia, where they were made thirty-five years later in 1685. The first brick machine of which there is any record was made in Philadelphia in 1840. It was a soft clay machine operated by horse-power. This machine was destroyed in 1844 during a riot caused by the brickmakers fearing it would take the bread out of their mouths. In 1847 a dry clay machine was made in the latter city. That the molding of bricks by hand can be done rapidly was clearly demonstrated at Cincinnati in 1832. The molding of 9,000 bricks was then considered a regular day's work. In a contest at this date between two expert molders, working from sunrise to sunset, one molded 24,700 bricks, and the other 25,470. A similar number was molded at a contest in Philadelphia at a later day.—*The British Clay-Worker*.

GOOD ROADS--PLEASURE OR PROFIT.

The present movement in the interest of better country roads is more widespread and energetic than has been witnessed in this country previous to this time. Just now, no man who holds a public office through the franchise of our rural population, nor any newspaper man seeking general patronage fails to ventilate his views upon our public road systems, and to suggest some plan for road improvement. Every newspaper editor must say something upon the subject or he is out of line and soon falls behind the procession. While this is all right, and the agitation of the subject is attracting quite general attention, it gives rise to a great deal of gush and impractical projects, not unmixed with unjust censure of previous road management.

We are of the opinion that the present agitation along this line comes largely from a desire for pleasure and social improvement rather than for the profit

financially which will result from the use of good roads, instead of poor ones. In other words, it is the luxury rather than the profit of good roads that is at the bottom of this movement. We think good roads ought to be made because they will yield a profit to those who pay for them. We believe, however, that is not the history of the case. People can be persuaded to pay for a luxury easier than for a necessity. It is human nature, and we are entirely willing to see our road advocates take advantage of this weakness in humanity as long as the outcome will give both pleasure and profit to the public.

When we talk about better roads we must keep the fact in mind, that those who are at present benefited by them must pay for making them. They will not be built by magic. No outside power is coming into our midst and construct our roads for us. And right here is the obstacle. Our farmers are willing and ready to have good roads, but are not willing to pay for them. The view of many that both town and country should pay for road construction according to the benefits that will be derived by each party, we believe is a correct one, but we doubt if it will ever be possible to carry it out in full, and to the satisfaction of all. The tax must fall most heavily upon property adjacent to the road which is improved, and until land owners are willing to assent to this proposition, we do not believe that any general system of road building will be adopted. It is not just to the present generation that we should pay the entire expense, but it should be distributed over a number of years of time by means of bonds which bear a low rate of interest. The second generation which will receive as great benefit as we, will in that way, bear its share of the cost of our improvement.

If Sir Isaac Newton forgot for the moment that he himself could change his seat when he was so absorbed in his work that he asked the maid to remove the fire!—if the Dean Swift could forget his own name on the threshold of a friend's house—if the greatest are liable to abstraction so intense as to make them forget the simplest things, surely the mass of mankind cannot escape the same tendency. The advertiser's emblem should be the Forget-me-not—*Fame*.

MENTION THE CLAY-WORKER

When writing to Advertisers

MENTION THE CLAY-WORKER

INDIVIDUALITY IN CLAY WORKING MACHINERY.

MANY of us have read of the man whose perceptive and analytical powers were so dwarfed that, in observing a number of objects of a given species, no single one conveyed a distinctive impression to his mind, but all were alike to him, no matter how much they might vary in beauty of formation, perfection of development or peculiarity of configuration.

"A cowslip by the water's brim,
Only a cowslip was to him."

We would hardly congratulate such an individual upon his acquirements in this line, and yet it is a fact that we unconsciously imitate him in other lines, notably that of various forms of machinery, and fail to note the distinctive and advantageous features of new and perfected appliances. This is a state of affairs not to be commended, for originality, individuality and progress in the successful development of machinery should be an interesting study, even if its neglect did not entail upon us'ope-

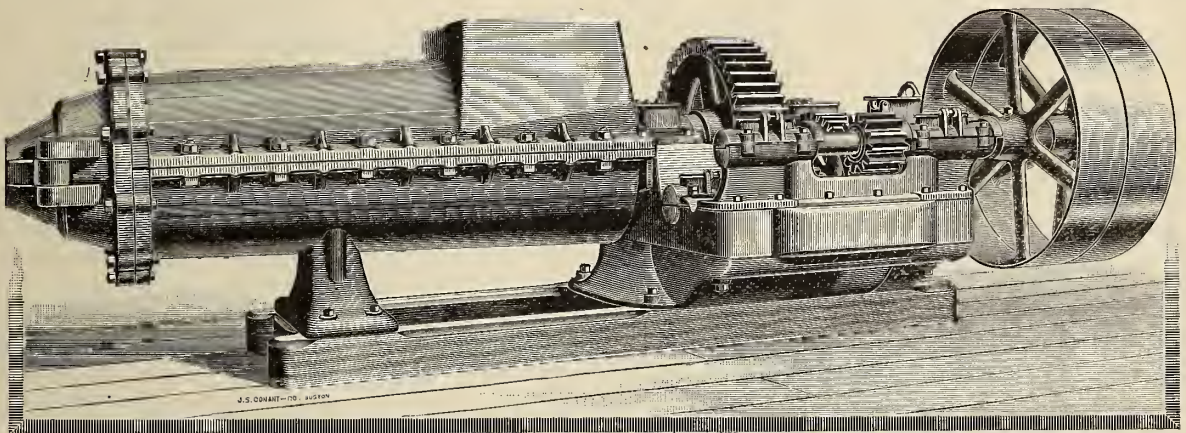
ticularly those making soft mud brick from mild clays. When, however, the wire cut brick machines were introduced and the tougher, stronger, more tenacious clays were used for brickmaking, the inadequacy of the wooden clay mixers was readily apparent, and from that time dates their steady and marked improvement. The best types of pug mills are now constructed in a massive and substantial manner, so little resembling the early crude and imperfect forms that a novice would hardly recognize any connection between them, or that they were designed for a common purpose.

The latest effort we have observed in this line weighs in the neighborhood of 11,000 lbs. and is constructed throughout of the best of iron and steel. The tub is horizontal and tapering, so that the clay as it moves forward is compressed and pugged under greater pressure, ensuring more thorough preparation. The tub is 6 ft. long and made in sections, facilitating cleaning or getting at the knives or auger. It is also provided with a hinged front.

(permitting the adjustment of the knives to suit the particular quality of clay handled and the amount of preparation necessary) is an especially desirable one, ensuring any manufacturer of the best possible results in his own material.

The auger is of extra hard white metal, nicely ground and polished. The end thrust of the main shaft is sustained by two polished, hard metal thrust plates held in an oil chamber, and so arranged as to secure thorough lubrication of the wearing surfaces, thus reducing the friction and wear. The thrust plates are readily removable and can be replaced at slight expense. Means are provided of adjusting the shaft lengthwise to take up the wear of the auger, thus keeping the machine up to its full capacity at all times.

The balance of the machine commends itself to the observer by its substantial and effective construction, the main shaft being extra large and strong, the gearing extra heavy and of most approved design with steel pinions, and the journals long and convenient for oiling. The back frame holding all the bearings is extremely heavy, making it impossible for the bearings to get out of line and ensuring



THE PENFIELD NO. 15 TAPER PUG MILL.

rating our factories at disadvantage or even loss, because of indifference, or tardiness in investing and securing the advantages of advanced thought and effort.

One of the oldest forms of clay preparing machinery and one familiar to brick makers everywhere is the Pug Mill. Originally framed of wood, with wooden shaft, and operated by the inevitable sweep with horses attached, these machines were servicable even in their crude form, as is evidenced by the fact that they were used for so many years without any effort being made to produce anything better. Even at the present day they are a familiar sight in many extensive brick making districts, par-

The knives are wrought iron with steel face securing all the wearing advantages of steel knives, while if a stone or other hard substance should get between the knife and tub, the knife would bend instead of breaking, and by straightening would be as good as new. The knives are keyed in position and can be removed without taking out the shaft. They can also be adjusted to any required angle in order to secure the desired results as to tempering and capacity. For clay requiring considerable pugging the knives can be arranged with less angle, while if less pugging is needed and large capacity is desirable, their angle can be readily increased, thus securing the desired result in either case. This feature

rigidity. The machine is self contained, and mounted on sills, and is in every way a striking example of modern forethought and skill.

That such a degree of attention and skill should be devoted to the construction of even pug mills and other kindred auxiliary clayworking machinery, indicates that the machinery manufacturers are on the alert, and if the brickmakers were as ready to observe and adopt improved appliances as the manufacturers are to devise and produce them, a new era in brickmaking would soon be apparent to any.

OBSERVER.

[NOTE.—We illustrate the machine above referred to by our correspondent. It is known as the Penfield No. 15 Taper Tub Pug Mill, manufactured by the well known firm of J. W. Penfield & Son, Willoughby, Ohio.]

A CHARACTER.

pleased my neighbor Jim.
When it rained
He never complained,
But said wet weather suited him.
"There's never too much rain for
me,
And this is something like," said he.

When the earth was dry as a powder-
mill,
He did not sigh
Because it was dry,
But said if he could have his will
It would be his chief, supreme
delight
To live where the sun shone day
and night.

When winter came, with its snow and ice,
He did not scold
Because it was cold,
But said: "Now this is real nice;
If ever from home I'm forced to go,
I'll move up north with the Esquimaux."



A cyclone whirled along its track,
And did him harm—
It broke his arm,
And stripped the coat from off his back.
"And I would give another limb
To see such a blow again," said Jim.
And when at length his years were told,
And his body bent,
And his strength all spent,
And Jim was very weak and old,
"I long have wanted to know," he said,
"How it feels to die," and Jim was dead.



"Excuse my left hand and the fact that I can't stop with you," said Jim, (perhaps).

The angel of death had summoned him
To heaven, or—well,
I cannot tell;
But I know that the climate suited Jim;
And cold or hot, it mattered not—
It was to him the long-sought spot.

—O. F. Pearre, in *Bloomington Pantagraph*.

CORRESPONDENCE.

THESE COLUMNS ARE OPEN TO ALL. THE FULL NAME AND ADDRESS IS REQUIRED BUT WILL NOT BE PUBLISHED EXCEPT WHEN PERMISSION IS GIVEN BY CORRESPONDENT. THOSE DESIRING TO COMMUNICATE PRIVATELY WITH ANY CORRESPONDENT WHOSE FULL NAME IS NOT GIVEN CAN DO SO BY ADDRESSING LETTERS CARE OF CLAY-WORKER.

A Brickmaker Who Appreciates Good Things.

Editor Clay-Worker:

After reading the last issue of CLAY-WORKER with much interest, I have felt I should once more drop you a few lines, thanking you for furnishing so much of interest for so little money.

I thought when I wrote you last I should have time to look the city over and be able to give you and those of your readers, who might be interested in the subject, a more extended report of Erie's business and future prospects, but you know, no doubt, when a fellow has to "hustle" 30 to 40 Poles and Hungarians every day, there is very little time left to devote to other objects.

The brick business has been rather quiet for the past month or six weeks. The yards have been storing some in the sheds and sending probably two-thirds into the market.

For some reason—the writer has been unable to find out—building is generally dull in Aug. and Sept., then brightens up later; may be it is because masons prefer cold weather and cold fingers.

The yards are now figuring on a half million job, but no doubt prices will be shaved somewhat, owing to short demand for big jobs.

At our place, we were unfortunate enough to have one man buried in the clay bank a couple of weeks ago. He is still on the retired list, at Hamot Hospital, and just here, I want to criticise this city of 40,000 people. In the whole city there is not an ambulance or conveyance of that nature to carry an injured person comfortably, and the idea of jolting over the cobble-stone pavement with a man injured almost unto death is outrageous. Right here is where brick pavements would be an advantage. Will Erie ever waken up to the beauty and utility of repaving with vitrified brick? Let us hope so.

Your portrait of Mr. Webster, in the Sept. CLAY-WORKER, is very life-like, as I had the pleasure of meeting him in July last. The Jarden Brick Works are indeed very large, and no doubt, takes a good looking as well as a long headed man to manage it. We saw some very handsome brick made by that firm, in

the Builders' Exchange, in Philadelphia, as well in the company's office, lately. It almost makes a fellow weep to compare a soft mud (or quick-sand) brick to those made of Philadelphia and Jersey clay on the dry press machine. But then every body cannot be happy, so what is the use of crying? Some day we may "tumble" to even a better mode than the dry press, who knows?

Erie, Pa.

W. R. O.,

The Labor Question.

Editor Clay-Worker:

Labor Troubles is a subject which has received the attention of two consecutive conventions of the N. B. M. A. The CLAY-WORKER also has repeatedly referred to the question in its editorials, and published letters on the subject from its correspondents.

It is quite impossible that any more important matter could be discussed in a business, where the item of labor represents so very large a proportion of the cost of production, as in that of brick-making.

The Labor Question is one which has, everywhere, been steadily forcing itself into public notice, especially during the last decade, and what its position will be at the end of another ten years, only the experience of that period can possibly determine. In the recent general election in Great Britain, Mr. John Morely, Mr. Gladstone's most trusted lieutenant, and personally one of the most popular men in England, almost lost the seat he had always previously held by overwhelming majorities, simply because he would not concede to the demands of the Labor Party.

I have just, for the "severalth" time, read Mr. Purington's paper on this subject, read at the Indianapolis convention. This paper I have always considered the most valuable contribution offered at any of the conventions. It has but one fault—it is too short; but in the few sentences of which it is composed, the writer takes firm hold of the subject, and strikes one vigorous blow right at the very root of the whole matter, when he says the cure for this trouble lies in education.

As yet the laboring class knows not its full power. It is, however, fast learning it. Is it better that the teaching of that power be left to hired agitators, who live upon what trouble they can make between capital and labor, or that it be done by the employers, whose in-

terests (as well as those of the employed) so very largely depends upon the existence of confidence and good will between both these classes?

In what is called by Mr. Purington "profit sharing," will, I think, probably be found the solution of this problem. Mr. Harriman, in his eloquent paper read at Washington convention, also refers to this as "Co-operation," but seems rather to favor dealing with the question by legislation. This, I consider, distinctly a move in the wrong direction. What is the use, for example, of ordering a walking delegate off your premises, when he can button-hole your men at the first corner, or of trying to stop, by restricted immigration, an evil which is already clamoring at your door? Propositions, such as there have been already tried, only to prove their ignominious failure.

In Father Crary's letter in April CLAY-WORKER, reference is also made to "Co-operation;" although the plans he proposes for the carrying of it out, are not, I consider, at all practicable. The employe must be free from the responsibility of loss, which he might not be in a position to bear, but ought certainly to share in profits arising from diligence on his part.

What I now suggest is this: That the subject be taken up again, for the third time, at the coming convention, and that members, in the meantime, give the matter some thought, and go prepared to discuss it fully and in the proper spirit. During the interval till the convention, let us hear from all the employers and employed, (especially the latter, many of whom may not be able to attend,) through the columns of the CLAY-WORKER. Do not be afraid, brother workers—we are all workers, whether with the head or hand, the shovel or the pen—of grammatical errors. It is ideas we are after, not grammar and spelling, and our good friend, Bro. Randall, will see that they appear in good shape.

Gentlemen of the brickmaking fraternity, I warn you, brethren of the N. B. M. A. I entreat you, give this matter your earnest consideration.

R. M. GREER,

Tuxpam, Mexico, Sept. 1, '92.

P. S.—The motion of Capt. Crafts, passed at the Indianapolis convention though perhaps hardly specific enough for the practical laborer, clearly shows that the heart of the association is right on this question, and that its successful solution is only a matter of time.

An Old Brickyard.

Editor Clay-Worker:

Being a subscriber to the CLAY-WORKER, will you allow me to give a description of one of the oldest brickyards in South Carolina? The brickyard in question is situated twelve miles from the city of Charleston on the Wando River. The plantation that it is on was purchased about the year 1802, by the grand-parents of the present owner, J. S. Horlbeck. As it had a nice bed of clay on it, they concluded to go to brickmaking, and began in the old fashioned way, by mashing clay with oxen. They went so far as to put up a round top house over their clay pit, so as to protect the oxen from the sun. They made brick that way for five years, but found the demand increasing so largely that they thought they would find some other way by which they could supply the demand.

They went North and returned with the State right of the Hall machine, so popular at that time on the Hudson River. They first put in a 50 H. P. engine and boiler and then put in six Hall machines on each side of it, making twelve in all, which enabled them to make sixty thousand brick per day, working six machines one day and the other six the next day. They worked the yard under this plan until the war broke out. Then after the war, the two grandsons, Messrs. F. H. & J. S. Horlbeck, operated the yard under the same old plan until about 1877 or 1878. At that time, both of them being interested in agriculture, they turned the yard into a drain tile factory, as the planters were becoming interested in the drainage of their lands. They bought a patent tile kiln, also a hand power machine, and went to work.

In the fall of 1880 the writer was engaged as foreman of the yard, and has held his position ever since.

The firm run the hand power machine for one year and then, as the demand for tile increased, they purchased a Penfield machine in 1882. In 1883 one of the firm died, which left the present owner, J. S. Horlbeck, sole owner and proprietor. In 1885 he put in a La-Tourrette auger machine and after using in one year exchanged it for a La-Tourette plunger mill, which he is still using.

For the last three years there has not been such a large demand for tile, and as there was not enough demand to warrant a season's run, Mr. Horlbeck decided to

go back to his old business of brickmaking and erect in connection with his tile works an improved brick plant. With these ideas in mind, he began looking around for a machine and improved kiln. He at last concluded that the P. L. Sword & Son machine was the one that would suit his clay, and he purchased one of the latest improved pattern. He has since added a Brewer crusher, also a new 40 H. P. engine and a 55 H. P. boiler. The next improvement on the yard was a Morrison Kiln. Believing in the old adage that "What is worth doing at all, is worth doing well," he had Mr. Morrison send a man to build the clamp, and make the first burn. And let me tell you, Mr. Editor, that he sent the right man. It is seldom that we run across a man that understands his business as well as Mr. Wright, the gentleman referred to. Beside building the kiln, he set up the machine and boiler. We made three arches of brick, and he burned them, and it is one of the nicest kilns of brick ever burned on this yard. There were good chimney brick under the platting.

Mr. Horlbeck has also come to the conclusion to use dump cars for conveying the clay from the bank to the machine. He formerly used carts, but found them too expensive. He will run the cars by mule power this season, but I would not be surprised to see a wind-ing drum or dummy engine go in in another year. We dry our brick on open yard and trust to the sun to dry them as a great many others do, but should the demand warrant it, think he will put in a good dryer next year. We can generally dry our brick in from 6 to 8 days in good weather, and it takes us from 8 to 10 days to burn them. Should the business warrant it, I would not be surprised to see a Chambers Brick Machine on this yard within a few years, as Mr. H. has one of the finest beds of clay to be found in this section. In fact, he owns two other plantations with beds of clay on them, so his supply is inexhaustable.

There is some talk of making paving brick. Tests are now being made, and if the results are satisfactory and the clay will make a vitrified brick, that branch of the business will be taken up.

Have just received a copy of the official report of the last convention, also my CLAY-WORKER, and am much pleased with them both. I have been burning and handling brick for the last twenty years

and do not see how any brickmaker can afford to do without the CLAY-WORKER. I regard it as one of the most instructive books I have ever read, and I shall never be without it again, so long as I can raise \$2.00.

A. FOREMAN.

Jersey Brickyards.

Editor Clay-Worker:

From time to time there appears in the CLAY-WORKER photo views of brickyards with description of same, so I will try to describe how yards are built and equipped in this section. It may interest some of your readers, if not all.

Like all other trades, there are some advanced thinkers in it who, no doubt, believe, and that honestly, that the method now in use by the majority of the manufacturers of brick is obsolete, or, in other words, think they are back numbers simply because they cannot make brick, rain or shine, twelve months in the year.

The columns of the CLAY-WORKER show how capital, not the conservative brickmaker, is caught by that alluring idea, a steady output from month to month, by the forming of this or that company with a capital of \$100,000 or more.

There is no manner of doubt that there is plenty of money looking for an investment, and why not drop some of their dollars in a business that they do not know anything about? To most people it appears as if there were millions in it, and it looks as if it were a fair field to enter.

So long as large companies become located in different parts of the country just so long will your correspondent, who so graphically described that "monument to failure," have plenty of subjects for his able pen, and the builders will inscribe on them, "Died from Over Production." The good Book tells us to "Hold fast to that which is good." The sunshine system has been in use from the earliest ages and has proven a good way to make brick, and a good way to make money, as well.

That there is an improvement in building brickyards is seen in our travels in different States. The Hudson River and New Jersey tide water yards are as near perfection as it is possible to make an open yard. Space is utilized to the fullest extent; the yard is so laid out that everything is handy.

In some cases there is a great deal of filling in to be done. At Haverstraw, the vessels lay aground when loaded, which gives the brickmaker a chance to set his shed quite close to the bulk head line without any danger of the kiln sliding into the river. The Hackensack river is bold, the vessels being afloat all the time, so that the sheds are set back quite a distance.

When it is possible, the yards are laid out 240 feet long from shed to machine and 37 feet wide. In that length, 13 rows of six brick molds are dumped, making 23,400 brick to a pit, if dumped

close. When hacked, two hacks ten high, with an odd handful on top, will hold them.

As on that length yard three hundred molds long can be dumped, it will be seen that it is much easier for the men to hack than when the rows are shorter and the hacks higher. There are yards that hack their brick fourteen high, when space does not allow long rows.

There is one very decided improvement over the old style, and that is, having alley-ways between the hacks. When one compares the time required to batten at present time, with the old way of carrying all the battens and saddles and piling them at the end of the yard, it would seem as if main strength and stupidness controlled their actions.

Time is money. When one sees the men go out to batten the hacks and sees how quickly it is done now, it would seem as if the old system was more to kill time than celerity of movement. There are times when the putting of battens on the side of the hack from which the shower is coming is the means of saving the brick.

To-day on the open yards, the foreman sends out four men to cover hacks, that is to put up the battens, the saddles being already on, as that is done by the men when they hack the brick. Two of the gang go on the yard side of the hack, the other to the alley; here the battens are piled about thirteen feet apart. The men pass a batten over the hack, and while the men are standing it up, the others place one against the hack on the inside, if it should require that, but only one side should be battened when in a hurry. It is surprising to see how soon they will have the covers in position. With the old way of carrying off all the battens and saddles and piling them up at each end of the yard, send the same number of men out to cover hack, two men take a batten and walk down the yard and place it in position; see the time consumed while the others are passing the battens over and placing them against the hack.

The inch board batten of former years is no more, having been replaced by the half-inch stuff. I do not think there is a yard within one hundred miles of Hackensack that does not use battens on each side of the hack.

No doubt, many of your readers will remember the time, not long ago, when battens were used on one side and drop boards on the other. A ten-inch board placed at the bottom of the hack to keep the drip from the saddle from touching the bottom course of the brick. When the wind changed, as it often does during a storm, all hands were called to shift battens. At present, when the hacks are battened the work is done, unless it blows a gale, and then a few saddles are liable to be blown off.

During the past week, one of the yards that hacks its brick fourteen high, had all the hacks doubled, when a heavy

southwest storm came on, and not a hack fell. Rather a better showing than is related by some of your readers of their experience with open yards.

The long yards use a thirty-five inch batten with the legs about four inches long. Those that hack fourteen high, use a batten ten inches higher, so that they can set them well off at the bottom, thereby forming a good brace for the brick as well as covering them. The alley-ways vary in width, according to room; from five to six feet is the general run, although some are wider. The wider they are the better chance for circulation of air, as well as for the men to handle battens.

The day of the two inch hack plank is past. The size now used is three by eight. In times past, many hacks have fallen just from using a two-inch plank. It is not an unusual sight during a heavy shower to see two inches of water on the yard. With the three-inch plank the brick are out of danger.

Most of the yards have quite a crown to them, throwing the water both ways; that is, when they have a ditch at both ends of the yard. Others have a tight gutter on the shed, the yard has a slight fall toward the machine, throwing the water all one way.

Along the Hudson there are two yards to one machine. Here three yards to one machine. The sand is fine, the land low, the brick dries slowly; probably about a dozen times during the season the brick can be hacked the same day they are molded and to do that, they must have a clear warm day with a good breeze.

At Haverstraw, it must be a very lowery day that they are not able to hack the same day they make their brick, and they generally have them hacked by three o'clock P. M.

The same kind of machines are used—soft mud. In setting the machine if two yards are used, the hack comes in front of the machine. If three yards, the middle one in front of the machine which causes a gap in the hacks so that they can truck through to the outside yards. In building the shed that covers the machine, the old style of setting two posts in the yard, with a plate to nail the boards to, is a back number. The way they build them now, the trucker has a clear field to come to the machine, no posts to run against. The boards are nailed to a plate, with an off and on piece spiked to the machine-post to hold it in place. In setting the machine, a foundation of brick laid in cement is used. The machine sets well up, so that the legs keep dry. Formerly, they just put a plank down and set the machine on it, with the result that it was always settling, causing breakage, as well as legs rotting.

We have the tempered mud, the sod pit, with one yard using the pug mill. It would seem that as his clay is of the same nature as the sod pit yards, that he could temper his stuff just as well as they. He fills his pits and coals them, just as the

yards with the sod pits do, and then shovels it in the pug mill.

The sod pits are built 16 feet long by 13 feet wide and four feet deep. The tempered pits are built to temper forty thousand, if required. Some of the yards run out thirty-seven, others thirty and in some cases, twenty-three to the circular pit. Each yard has two circulars to a machine.

All of the yards here at present are run by steam. There is one horse-power yard, but it has not been operated for the two past seasons.

The line of shafting is set on posts braced both ways. The engines are not all new, or were not when put on the yards. The great bugbear of second-hand machinery, which some of your correspondents seem to fear, does not hold good in the case of the engines here. There is one of 100 horse-power, and if there is anything that will try iron it is to hook on six or eight sod pit machines, with hard, stubborn clay and fine sand, and have her do her work day in and day out without any lost time for repairs. There is another of 75 horse-power that in five seasons has only lost one day for repairs, and she has run two circulars, two wipe out machines, and one sod machine.

Another yard has a full set of tempering wheels that had been in use in another state, but no break down occurs from their being second-hand.

There are no patent elevators for hoisting clay from bank to pit in use here at present. Some seven or eight years ago, one of the yards had such a rig, but change of ownership caused it to be taken out, and horses and carts took its place, so that all the yards fill pits that way now.

No steam shovels are found in the clay banks. A No. 1 Ames shovel, with a man to furnish the power, is found to be the most economical. Certainly there is no shifting railroad in the bank, as the horse can put the cart just where it is wanted. If, as in some banks, they are worked in benches, the horse and cart can reach each bench, while the steam shovel with its steam attachment, would be compelled to stay at the bottom of the bank.

For long transportation of clay, the horse and cart has superseded the movement of the clay by railroad and dump car, as it has been found to be a cheaper method in every respect.

There is one yard in Haverstraw that fills pits by car, but not because of the distance. The reason is, that on the river front where their clay bank is, there is another yard that transports its brick to tide water by cars drawn by a dummy engine. The outside yard uses the same track to haul its clay, only it uses horse-power.

There are three yards here that have stopped for the season of 1892, and they all have their brick set in.

One of the yards would have been all through burning, but they had to wait for wood; they have two kilns to burn

will be all finished up by the first of October, just one month from the time they stopped molding.

Mr. J. W. Gillies' yard ceased molding on the third of September. He is now burning his second kiln, but will have to wait a week or more for wood for the next. The first of the three kilns of brick which he had to burn, contained thirty arches, with about forty-three M. to the arch, about 13 hundred M. in the kiln. He has not shipped any of this season's make to the New York market. He has had some local trade, and at present writing, he has on hand under shed some 93 arches, say four million brick. Fifteen, or more, thousand dollars piled up, in hopes that the market may advance so that he may receive a fair return for the season's work and outlay. But will it? Hope is strong, even if indications have not a rosy hue.

The Gardner Bros. stopped on the third of the present month with three kilns to burn. They have burned one and are now drawing in wood for the other two.

Several yards in Haverstraw have stopped the past week. The 1st of October more will stop. They have kept on in the hope that there would be a decided advance.

If but a small quantity has gone to the market, but a small quantity was required to meet the demand. As the season shortens, the Hudson river men will have to market some of their stock, as they cannot depend on the river remaining open after Dec. 1st. Weather permitting, they will send them along. Will the market hold its own? It is an uncertain as the re-election of your fellow townsmen.

Columbus upset things some time ago; just so he, or those that want to do him honor, will upset business in N. Y. City for a week during the celebration. Brick will not be laid, but will be shipped, and accumulate in the market in favor of buyer.

Market at present shows but few barges laying at the docks. Top price for Haverstraws, \$5.37½, with good brick from same place selling at a lower figure. Pale brick, \$2.00 and \$2.50 per M.

A. N. OLDTIMER,

Hackensack, N. J.

Ohio Valley News.

Editor Clay-Worker:

The plant of the Phoenix Fire Clay Co., at Malvern, Ohio, was offered at receiver's sale for the second time Sept. 7, but as there were no bidders, it will again be offered Oct. 9. It was reappraised at \$20,000.

On Sept. 3rd, on the property of the Markle Fire Clay Co., at Markle, O., the workmen engaged in sinking the shaft, reached a splendid vein of coal at a distance of 52 feet, and fire clay four feet deeper. This is very gratifying to the company as they expected to go much deeper. The State Geological Surveyor told the company they would have to

go at least 75 feet for their clay. This is a continuation of the famous Toronto and New Cumberland, W. Va., vein of fire clay, so well adapted to brick and sewer pipe.

The Forest City Sewer Pipe Works, of Toronto, Ohio, are running extra time, making their patent fire proofing, for which they have just taken a large contract.

A suit, brought by Carrie Porter, wife of Capt. John Porter, against John Mack, president of John Porter Co., of New Cumberland, W. Va., has been removed from the circuit court of Hancock Co. to the U. S. court at Parkersburgh, W. Va.

The plaintiff hopes to compel Mr. Mack to relinquish his rights and ownership to a farm with valuable coal and clay deposits to said plaintiff. There is a long legal struggle ahead and much speculation as to the outcome.

Bids for street paving were opened by the City Clerk of Steubenville, Ohio, Sept. 13 for paving seven squares with vitrified fire brick. The contract was let to Floto Bros. of that city, at the low price of 55 cents for brick, and paving, with foundation, 21 cents, without, 16 cents per square yard.

The John Porter Co. of New Cumberland, is away behind their orders, running their six plants to their utmost capacity, also disposing of the entire product of the Lone Star Brick Works at Anderson, W. Va.

The monthly pay roll of the Porter Co. for this month (Sept.) was the largest ever made since its organization, being in excess of \$18,000.

The paving brick market is more firm at present. This is caused by the demand being greater than the supply, as all contractors are rushing their work and completing it before the inauguration of Jack Frosts' fall and winter campaign.

Mr. Chas. Rossen, the well known paving contractor, of Bellaire, Ohio, threatens to bring suit against the city of Barnsville, Ohio, for \$9,200 for paving and \$3,600 for breach of contract, unless the settlement is promptly made.

Sept. 24th bids were opened for street paving in Beaver, Pa. There were 14 bidders and prices ranged from 95 cents to \$1.34 per square yard. The contract has not yet been awarded.

The pipe and brick manufacturers on both sides of the river are complaining of a scarcity of freight cars for shipment of their products. This is felt doubly keen at present, for navigation has been entirely suspended on the Ohio since the middle of July.

The Great Western Sewer Pipe Works of Toronto, Ohio, made a phenomenal run of 30-inch sewer pipe, making 230 as a day's work.

BUCKEYE.

The Village Brickyard.

Editor Clay-Worker:

During the summer a number of articles from the skillful pens of my esteemed brother brickmakers have appeared in the pages of the CLAY-WORKER in regard to manufacturing "Brickmakers" by the wholesale, producing them like lawyers and doctors in colleges and universities.

About a month ago the writer found himself in the midst of a dull season; something that had not struck him for several years, and casting about for a profitable outing, concluded to take a run over to Boston, Albany, Niagara, Buffalo and various points by the way. Passing through the fertile lake region of Central New York, a day was spent at the village of Penn Yan, which is situated at the outlet of Lake Keuka formerly called Crooked Lake; this is a most beautiful sheet of limpid water some thirty miles long, with vine clad hills, which seem to give occupation to most of the soil tillers thereabouts; so much so that it is not uncommon to have thirty tons of grapes shipped from the Penn Yan steamboat landing in a day. On the lake this season is the staunch new steamer, "Mary Bell," built of iron and costing \$27,000. And fish! why, these lakes are just full of them, although they do not behave like they used to, in fact, they do not often jump in the boat, and it is very seldom people who bathe in the lake, catch one on each toe, yet they have been caught both of these ways quite recently. The before mentioned "Mary Bell," has a pilot, a young man of thirty, called "Harry Marsh," who has grown up on the lake shore, and it is related of him that when a boy of seven he, with his parents, being out on the lake in a small boat fishing, the small boy gazing over the gunwale into the crystal water suddenly gave a terrific scream and fell fainting into his mother's arms the blood flowing in a stream from his nose, it was found on examination that a lake trout had jumped for that red nose, and the boy being badly frightened had fallen back in the boat and lauded the fish. That trout weighed eight pounds, and the novel plan of its capture attracted the whole village to see it before being served for next morning's breakfast, and to this day, "Harry Marsh" has to daily repeat the story of how his nose received the dark red scar, which the fish left him as a life long evidence that some fish stories are true.

Well, do I hear my brothers say,

"What has fish got to do with brick-making;" that is exactly what I'm going to tell you; whenever you get a bite haul in the line never mind how unusual, unprofitable or heterogeneous the surrounding circumstances, so there is a bite and at the other end of the line, a fish, be sure you land him.

Brother Randall, I notice, gets many a curious bite, and his rare skill in landing the fish that each of us may have a full breakfast goes without saying: Suppose we now fix a name for the new college that is going to produce the future brickmaker, say, "Clay University" or, to be a little more homely, "Bricklyn College." It seems to me the latter will cover the regular course of study for the present, and after while, the brickmakers of the future will then have room to go on and call it a 'Varsity.

In entering into an examination of what we are going to teach at our college, of course, as it is going to be a new institution without precedent in its line, we shall have to call the ripe minds of our National Association to the council of those who want to talk; those who know it all, and more especially those fellows who sit over in the corner, and after the public meeting is over, give us the solid nuggets of their individual experience, without any regard as to whose machine; kiln or method goes under, the truth is what we must build on, notwithstanding it may temporarily give some advertised plans the black eye.

And in doing this, we must act with "horse sense" that no injustice be done from a defective judgement on our part.

"THE VILLAGE BRICKMAKER."
[TO BE CONTINUED.]

For the Benefit of Beginners.

Editor Clay-Worker:

In renewing my subscription to the CLAY-WORKER, which I consider a very valuable paper for all brickmakers, I would like to say a few words on the pressed brick question for the benefit of new beginners. In the first, place, they want to be sure that they have a bed of clay that will make dry pressed brick, and the next thing they want is to see that they do not get a Kennedy machine, as they are neither useful nor ornamental. This machine has broken up and disgusted more new beginners than any other machine ever put on the market in the West.

If you want to make brick from the average kind of clay found throughout

the western and northwestern parts of the United States, get a good dry press machine every time.

I am working for the Salt Lake Pressed Brick Co. They have two Boyd machines, both of which they run during the day, and one at night, making an average of 60,000 brick per 24 hours. They make a red shale brick that is not to be equalled in any place west of St. Louis. The demand for their white, buff and red brick so far exceeds their output that they have had to refuse several large orders within the past three weeks.

I have also used the Lion dry press and can commend it very highly.

Respectfully Yours,

R. W. JOHNSON,
Mill Creek, Utah, Sept. 24 '92.

Philadelphia News.

Editor Clay-Worker:

From present indications the number of buildings erected and in course of erection this year in this city, will far exceed those of last year and this state of affairs brings forcibly to notice the fact that there has been more of colored bricks used than common, that is to say buff and other shaded brick. This city spends over \$30,000,000 yearly in the erection of buildings, a large portion of which are dwellings. Philadelphia may well be termed the city of homes. In fact the manufacture of fancy brick has engrossed the attention of architects and builders to such an extent that great numbers of the large buildings are built of this class of material. The new Reading Terminal will be built of stone and a pink shaded brick, that is the front part of the depot, while the train shed will be built of a beautiful buff brick supplied by the Peerless Brick Company. The Jarden Brick Company also supplied a great number of public buildings and dwellings with their fancy brick. The new Betz building, corner Broad and Market streets, is now finished to the eighth story, all of buff brick and iron. The building when finished will be ten stories high and be as near fire proof as it is possible to get a building. There is a great amount of building work in sight, quite enough in fact, if all materializes, to keep our brick yards busy for some time to come, as the stocks are light in the yards and this of itself will no doubt insure a steady run throughout the winter.

The well known brick manufacturing

firm of Peter Byrne & Son of Twentieth and Cambria streets and also Twenty-ninth and Cambria streets have just shipped to the World's Fair, Chicago, 15,500 stretcher bricks, to be used in the erection of the building to represent a workingman's home in Philadelphia. The structure will be erected under the auspices of the Auxiliary Board of Lady Managers at a cost of \$2,500. It will be of Philadelphia brick and brown stone and will exhibit to the world the style of home owned and occupied by the average Philadelphia mechanic.

Berger & O'Brien Fire Brick and Clay retorts, Twenty-third street above race are enjoying a good share of patronage. Messrs. Berger and O'Brien manufacture largely fire brick and clay retorts, tiles, fire clay mortar, ground bricks, etc., while they likewise make blocks and tiles of any shape to order. The works are equipped with all the latest improved apparatus, machinery and appliances, and the various processes of grinding, moulding, drying, pressing, burning and finishing are all systematized and achieved with the greatest economy of time and labor. There are three kilns on the premises that have a capacity of thirty thousand fire brick each.

For the first three quarters of this year there have been seventy-three new brick yards opened. In the first quarter twenty-three, second quarter thirty-five and the third quarter thirteen, a very good showing for the industry in this section. ANON.

A Pleasing Picture of Industrial Growth.

Editor Clay-Worker:

We embrace the present opportunity to give the readers of your valuable journal some information relative to the clay interests in this vicinity.

The Streator Clay Manufacturing Company opened their first kiln Thursday, September 14. To say the result was all that had been anticipated would mildly express the satisfaction of those interested. The president of the company, Mr. James L. Daugherty and others interested came to our city from Toronto, Ohio, at which place they had been engaged for a long period in the manufacture of sewer pipe which they purpose to make their principal business at this place. Coming from so famed a location for the production of clay goods, and being men of large ex-

perience and abundant capital, is sufficient guarantee that they know their business and speak understandingly when making the claim that their product here will at least equal any produced in the country.

The pipe as removed from the kiln gave evidence of superior workmanship and quality of material, the surface being smooth and compact. The absence of checks, cracks or unevenness was potent even to the untrained eye of the novice. When broken the ware showed a fine texture being compact in structure, fused into a solid mass having the appearance and lustre of metal the color shading from the outer surface to the inner surface from a beautiful lively steel to a subdued red.

If the actions, facial expression, etc., of those interested were the tests by which we were to measure their faith in this great undertaking, we would say without any reservation that their most exalted hopes had been realized.

When ages have come and gone, and the learned men of thousands of years hence go delving into the earth to learn her secrets, the broken pipe of today will be dragged from its burial place, but time and the elements will not have defaced it, they will have ceased their efforts to rend and destroy it, for it will have defied all the powers that tear asunder all other substance, and will lie before its finders the dumb historian of the energy, push and intelligence of the Nineteenth century.

The Streator Clay Manufacturing Company have erected at an outlay of a large sum of money, a very extensive plant equipped with the latest improved machinery, which with the large capital at their command, experience acquired by years of patient industry and immense quantity of very superior material, insures them success from the start. In a few years at most, the wild flowers now flashing their bright colors in the sunlight of this beautiful autumn morning, will have given place to a different scene. The slender, graceful golden rod, in bright dress of yellow like the fashionable butterfly, seems to realize that but a short time remains for its conquests. From the grass roots, down one hundred and fifty feet, are alternate layers of soapstone shale, coal, fire clay, and clays of finer grades, suitable for all manner of clay goods. For some three miles this valuable mineral protrudes from the river bluffs, varying in thickness from twenty to seventy-

five feet, inviting, aye pleading, with capital and labor to come and be filled.

Who will be the fortunate ones that will grasp this mountain of wealth and hold their vessels under this never ceasing fountain of flowing gold, now almost untouched and until recently unknown, in quantity sufficient to build the cities, pave the streets, care for the sanitary condition and supply the domestic wants of the Twentieth century.

It requires no great stretch of imagination to see the huge columns of smoke as they ascend from the hundred furnaces which will line the banks of the Vermillion, as they are converting this now almost useless material into things beautiful as well as useful to man, giving employment to hundreds, possibly thousands of men, and covering this beautiful valley with the homes of a happy and contented people.

If the interest already developed be any indication of future fruitage, our city will be as famed for her products of clay as she now so justly is in the manufacture of glass and the production of coal, with our unexcelled railroad facilities, whose steel arms reach out in every direction, scattering our products in every state in the Union and returning those things we consume, at rates as favorable as any of the larger cities in the country. Well may we say with Paul of old, "we are citizens of no mean city."

C. G.

Streator, Ill.

Some Suggestions about the Yard.

Editor Clay-Worker:

I notice in reading the communications in the CLAY-WORKER, frequently some particularly good spurts of advice to brickmakers, especially to those going into the business.

R. Brick's suggestions in a recent number on the arrangement of the yard were right to the point. It is not possible, however, for every one putting in machinery to go to the expense of brick, stone and concrete foundations, and where there is one brick plant established of the magnitude and with the means to erect everything as suggested by R. Brick, there are a thousand or more that must start in the most economical manner.

There are many circumstances to govern what could be termed the most economical manner of establishing a brick plant. If a man has a location that warrants him a reasonably fair and

continuous market for years to come, and a clay-bank of sufficient depth to yield a supply of the raw material to warrant his remaining in one position, then most certainly the most economical manner would be to establish on the firmest foundation that his means would permit of. But if it was impossible on account of lack of means at the start to put everything in on concrete foundations, and on that basis, then there are good temporary ways, if properly done, that will cost but little and last a number of years, or at least until such a yard, if properly handled, will have the money to spare to build permanently, but where you find one location with the above requisites as to clay and market, you will find many that are good so far as market is concerned, but clay only 18 to 24 inches in depth. In such a location I would not advise the expenditure of more money in permanent works than is positively necessary. A solid foundation for your machinery is a positive necessity, whether it be for horse or steam power, and especially for the latter.

There is hardly a location in this country where good timber of some kind cannot be obtained, and a foundation made at very little expense. Shafting and pulleys must positively be in perfect line or there will be constant trouble, and my experience in putting up machinery is, that it is just as easy to have your shafting level and your pulleys and everything else in line as to have it otherwise. Machine manufacturers should never send out a brick-making plant of any character, be it large or small, unaccompanied with a diagram, showing the exact position of everything; to each pulley should be attached a tag with a memorandum stating its position and its speed, and that it drives or is driven by a certain other pulley which runs at a given speed. These precautions should always be taken whether a man accompanies the machinery to superintend putting it up or whether the purchaser does it himself, and by so doing much time and money is saved, as everything goes together perfectly, and starts off at the very outset like old established machinery.

R. Brick's suggestions regarding tools and a tool room cannot be too highly appreciated. He is a practical brick man, has superintended both large and small works, and understands fully the necessity and economy of these things,

but he possibly will be surprised when I tell him that if brick machine manufacturers would suggest, and insist upon their customers purchasing such tools and arranging such a tool room in connection with their yards, nine out of ten would say at once, "Well, if I am obliged to establish a machine shop to keep this machinery in repair, I don't want it," but the time comes when he learns by experience that it is not a shop to keep his machine in repair, but a place with tools and appliances to do the thousand and one little things that otherwise would necessitate running to some black-smith or machine shop, the expense of which if separately kept, would surprise one at the end of the year, and if properly kept, it would doubtless be seen that but very little of the work done belonged to the brick machine itself.

A steam yard should have in its shop a portable forge, blacksmith's tongs, hammers, sledge, etc., also a vice with pipe-jaws, to be attached when pipe work is necessary, pipe cutter, stock and die for both pipe and bolts and nuts, two or three crow-bars, saws, hatchets, etc. A full set of such tools costs only from \$50.00 to \$75.00, according to the extent of the outfit. If the engineer is at all competent, or has any natural ingenuity, he should be able to do all the repairing about the yard, and will save much money that otherwise is paid out in little dribs, and with the time saved will be far more than the cost each year. Have a good tool room, with a good, firm bench, keep it locked, with some one responsible for the care of the tools; let every man come to learn that the tools are kept in one certain place, and can only be had by applying to a certain man, and that they must be returned or he will have to pay for them.

I must say that brick yards are not generally run on systematic and neat principles, but some are, and it is an exquisite pleasure to visit such a yard. All could be so run if a little more thought and care was given to it, and you would find it pays, not only in money saved, but satisfaction.

DEACON TIDD.

A Query For Anon.

Editor Clay-Worker:

Your Philadelphian correspondent, "Anon," in his August letter says, "The brick averaged about 500,000 lbs. to the square inch, which was thought a remarkable pressure."

This would, doubtless, be looked upon as a mistake in figures, were it not that in a few sentences previous, speaking of a brick press, he says, "This new piece of machinery will be operated under a pressure of six hundred tons to the square inch."

Is this thus, and if so, why this thusness. G.

It is, and That is Why the Clay-Worker Is the Best Advertising Medium.

Editor Clay-Worker:

Please find enclosed draft for six dollars in payment of our "ad." notice. The balance to be applied on subscription account.

I want to add that I have received proposals from all over the United States and judge from the character of most of the letters that the CLAY-WORKER is read by the most intelligent people engaged in the brick business.

Yours Truly,

J. D. DIFFENBAUGH, Treas.

Monmouth (Ill.) Brick Co.

Oct. 8th, '92.

CHICAGO MAKES ANOTHER GOOD CHOICE.

The good citizens of the windy city have, after much discussion, chosen for their municipal colors terra cotta and white, a very appropriate and tasteful combination. The *Herald* tells the story in blank verse, thus:

ALL ABOUT IT.

"Choose ye," said the chiefs, "some color,
Some befitting tint or pigment,
Some appropriate cosmetic
For the face of fair Chicago
At the World's Fair dedication!"

Then the artists came together,
Wrestled with the mighty problem,
Talked of every kind of color,
On the easels mixed their pigments,
Deftly wrought with facile brushes,
Wildly smeared the patient canvas,
Made unheard of combinations
With their red, and white, and azure,
Yellow, purple, amber, orange,
Tawny, crimson, gamboge, sorrel,
With their saffron, pea-green, lilac,
Primrose, russet, silver, scarlet,
Pearly, piebald, iridescent,
On a gray and smoky background.

Then on these contending artists
Fell at last an inspiration,
And with one accord their voices
Rose in favor of the choosing
Of a shade of terra-cotta
As the color for Chicago
At the World's Fair dedication!
So against your smoky background,
On "Old Glory," on your streamers,
On your banners and your emblems
Fling aloft Chicago's color,
Terra cotta! Terra cotta!
Paint the town with terra cotta!

THE CLAY-WORKER.

OFFICIAL ORGAN OF THE NATIONAL BRICK MANUFACTURERS' ASSOCIATION OF THE UNITED STATES OF AMERICA.

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T. A. RANDALL & CO.,

81 Massachusetts Ave. Indianapolis

WINTER BRICK LAYING.

Now the question comes up as to laying brick in winter. It always does about this time of the year. People who are building houses, stores, factories and what not, bring up the question as to what effect freezing may have on brick laying. This question has been definitely settled, experimentally, practically, scientifically, and otherwise, and there can be no doubt but that brick work as substantial in character, as solid, can be done in cold winter weather as in hot summer weather. A few years ago the German government went into this question very extensively and it was shown that without extraordinary precautions good brick work could be readily put up in the coldest of weather. One authority went so far as to state that hot summer weather was quite as injurious as the cold winter weather. The principle thing necessary is to keep the brick dry and to see that the mortar does not freeze before the brick is placed on top of it. Various devices are in use for keeping the mortar in proper condition on the mortar boards: namely, by using sheet iron boards, lamps under them, and other similarly ingeniously devised arrangements. A device which will secure an abundance of hot water which may be thrown on the mortar in very cold weather, is effective, though arrangements of this kind are only

necessary under the most adverse conditions, when the weather is exceedingly cold. Ordinarily the mortar can be carried from the bed to the mortar boards, placed on the walls, the brick on top of the mortar without any injury. In extreme weather only, the artificial devices are found necessary.

UNEXPECTED TURN IN THE HOMESTEAD RIOT

The arrest of the leaders of the Homestead riot on the charge of treason against the state puts a new phase upon that pastime. Hitherto the leaders in such affairs have not only gone scott free but often they have become heroes to be envied and almost worshipped. Cold law has said that the riot with its attendant bloodshed and loss of property was not exactly the right thing but it was pardonable or at least not punishable. True there were some features of the Homestead riot somewhat different from most other similar riots, but they were mostly only the logical growth of recognized and tolerated principles in all strikes which have assumed great proportions. To be arrested by the state on the charge of making war against the state means that at least in Pennsylvania the state intends to protect its citizens in their most sacred rights. The war upon the capitalists who had invested their money in an expensive plant which ought to produce a large income was itself a crime which the state should punish, but the direct sufferers in this feature of the strike were few, and at the worst they could not be brought to want, but when the brunt of the battle was against the common wage earner and was intended to bring him to starvation unless he consented to the conditions to be imposed by the rioters, the state could not refuse to interfere and punish those criminally who levied war against citizens of the state to deprive them of the use of the only capital they had—their labor. The public will watch the outcome of this new phase with great interest. If to defy the civil officer and obstruct with arms civil process is treason against the state, men will hesitate before entering upon such a crime in the future, and the laboring man who chooses not to belong to an expensive Union may hope for protection hereafter.

Another unexpected result seems likely to follow the Homestead affair;

as never before the relation of capital to labor has been discussed in the pulpit and by the press and in almost every condition of social life. The most apparent result so far is a general conclusion that the much-talked-of idea of compulsory arbitration has been generally accepted as wholly impracticable.

IMIGRATION AND ARBITRATION.

Imigration, and the questions which surround it is a part of the labor question. In the last month's number of the CLAY WORKER we spoke of the relation which conciliation and arbitration bore to the settlement of all labor troubles, but in all labor problems there must be as component elements, reason and intelligence to bring about conciliation or arbitration. Reason, intelligence, and the higher qualities of the mind, must be possessed by those engaged in labor or in employing it, in order that such a thing as conciliation or arbitration may be possible. There is no such thing as conciliation in a Gorilla. There is no need of arguing with a snake. No more is there reason in undertaking to conciliate the class which has had hundreds of years of bad foul history. In the countries of the Old World there is a class of people from whom no one expects good. They are inherently, naturally, logically bad. They are seemingly without good thoughts and full of bad thoughts. These people emigrate to America. Some come voluntarily, and some are sent here. They come here because they know that our government does not hold as tight a rein on the individual movement and action as do the governments of the Old World. They come here with false ideas as to what they can do. They are disturbing in all of their relations. There is no conciliation or arbitration in connection with this class. A good proportion of the emigrants are worthy people, but the proportion of the other kind is sufficiently great to make quite an impression upon the settlement of labor problems. Francis C. Walker suggests that each emigrant as he comes to this country should be required to make a deposit of one hundred dollars, and that under certain conditions it should be returned to him. It is assumed that the intelligence which would be required to accumulate that sum of money in the old country

would be instrumental in improving the quality of those who come to make a part of our institutions. This is one plan, possibly not the best. There is no doubt however but that our people are thinking about this question, and that in time something will be done. Certainly something must be done.

There is a definite relation between the immigration question and the settlement of labor troubles. We all know of a few crude fellows who are not susceptible to argument; a few who are evil minded and ill disposed. These can make trouble and prevent the intelligent adjustment of natural differences which arise. This question is a local one to every brickmaker and to every employer of labor and as well to every owner of property in America. It is a personal question with us all. Anything which will help to advance the intellectual standard of the country will make living pleasanter, make our lives happier and better and altogether contribute to a general advancement. One way to advance the standard is to keep the undesirable foul element out of our country. This is a question which our law-makers must properly work out.

GOOD AND BAD WORKMEN.

Never in the history of our country has there been a greater demand for skilled workmen than during the last building season. A demand for high grade workmen, those who can use their heads along with their hands, has been greater than the supply. A great deal of work has been badly done through no intention of those engaged on the work. The trouble was they did not know how. The injustice connected with this is that the public pay for the best work and do not get it. It makes a good deal of trouble all round. If a man does not know how to do good work he cannot be made to do it. Education cannot be forced on a single job. All one can do is to do his best. There is an uncomfortable time at settlement, and the old affairs are wound up in an unsatisfactory way. There is another injustice in this matter. Under the rule of unions the man who does not know how to do the best work gets as much money for his unsatisfactory performance as his more capable competitor. This is wrong. We have in our city four school houses in course of construction. The work is being done

by four different brick layers all under the same general specification. The work of one is immeasurably superior to the others. The difference is owing to the difference in skill of the workmen, yet the good, conscientious layer is no better paid for his work than the others. In this there is injustice.

PAYS TWENTY PER CENT.

It is said that the friends of a certain moneyed institution in Indianapolis have been soliciting business on the promise that it pays twenty per cent. per annum. Whether they succeed or not we do not care to say, but we do wish to say that all who invest in it may expect to be "Iron Halled" when they least expect it. But the fact that such promise is made is a sad comment upon the spirit of greed that obtains among us. Everybody should know that any scheme by which twenty per cent. as interest is realized must rob somebody. That money invested in some industry which requires the application of skill and labor may at times be extra profitable without oppressing or wronging any one no one will doubt, but in all such cases there are liabilities which enter largely into the cost of production and which may at any time change results from the profit to the loss page of the ledger, hence such a dividend from such an investment has none of the reprehensible features of a money transaction that promises unnatural results.

Something for nothing, or a great deal for a very little, seems to be the prevailing passion of the age, in the face of the uniform experience that schemes which promise this are frauds. It is only a species of gambling, and none the less to be condemned because men, and sometimes women, engage in it who sit in front pews in costly churches. The finale of the Iron Hall scheme is likely to be more serious than was at first suspected. The chiefs in it will probably not be prosecuted criminally, but the assets are not sufficient to meet demands. Let our readers beware of all schemes that promise something for nothing, or twenty per cent interest on money without the application of skill and muscle.

LUCK is a delusion. We cannot learn by luck. We cannot acquire anything worth knowing by it; it is all imagination. Pluck is a quality of character

well worth possessing. Pluck succeeds or makes an earnest effort.

BRICK VS. ASPHALT.

An argument in favor of brick pavements as against asphalt, is that a brick pavement is one that can be repaired without maintaining a special plant. We will explain this by stating that the production of asphalt pavements is practically a monopoly. The companies control the material out of which the pavements are made, and hence they control the plants which handle it. There are two or more organizations which put down pavements in our city, but there is a certain relation between them, which prevents dangerous competition. They come into a city, make a price on a pavement and guarantee it for a term of years. In order to make necessary repairs they must maintain a plant. This costs money. Of course the property owners, the tax payers, must pay the bills. With brick all is different. By using standard sizes of brick, as repairs are needed, any intelligent person can make them. This, together with the fact that brick pavements are more enduring than others, should lend largely to their more general use. The history of asphalt paving in our own city is not greatly different from that of most cities. The first pavement put down was a tar composition and was unsatisfactory. They then said that that which they had a mind to put down in the future was altogether the proper thing and the other one was not asphalt at all. It was tar. The second pavement was a failure and another company comes along and states that their material is the genuine product, and has good history back of it. It is a little better than the other; a little more satisfactory, and thus by means of promises as to what the future will bring forth, they are able to secure contracts. In truth, they are all made of Trinidad pitch, their composition varying as the Companies may choose to make them vary.

The brickmakers of Dubuque, Ia., at the instigation of the boss brick layers, having refused to sell the carpenter contractors any material, the latter have organized a company with abundant capital to make their own brick. An extensive brick plant will be erected, capable of turning out 75,000 brick per day, summer and winter.

TRADE LITERATURE.

SKETCH BOOK is the title of a beautifully executed pamphlet issued by the Philadelphia, Boston Face Brick Co., Boston, Mass., and which shows some of the many designs of ornamental brick mantels, doorways, panels, belt courses, etc., etc., which they have produced. The drawings show originality and fine artistic sense that must challenge the admiration of architects and builders, for whose use the book is chiefly intended. Those of our readers who have an eye for the beautiful in brick can secure a copy by applying to them direct and enclosing 20 cents.

The same firm also issues an odd catalogue illustrating all the various kinds of moulded and ornamental brick which they make in an almost infinite variety of form and color.

CLAY PREPARING MACHINERY is the subject of a special catalogue issued by J. W. Penfield & Son, Willoughby, O. From the front cover, which is a "beaut," being a rich brown coated paper with title embossed in gold, to the last page of the book it is a handsome specimen of art printing. The illustrations are as fine as can be made, and the descriptive matter is well written and carefully arranged. The catalogue, as its title indicates, is devoted entirely to clay preparing machinery, grouped under the respective heads of Disintegrators, Roller Crushers, Dry and Wet Pans and Pug-Mills. This firm also have ready to mail a new special circular of Horse power Brick Machinery. Copy of either or both of which they will mail free to any of our readers.

THE CHICAGO BUILDER & TRADER. Vol. 1, No. 1 of this new trade magazine has recently been received. It is a weekly publication, devoted to the building interests of that great city. It has been made the official organ of the Chicago Builders' & Traders' Exchange and is issued under the direction of three J's—James John, James Detrick and James Forsyth, the former being the gracious secretary of the Exchange and editor of the new magazine, which we wish a long life and great prosperity. It certainly has a rich field to cultivate and can do much good in fostering the vast and varied interests represented in the Exchange. The new journal should and undoubtedly will be accorded the active support of every member of the Exchange. The subscription price is \$2.00 a year.

We are indebted to Mr. J. H. Jack of La Fayette, Ind., for a copy of a well illustrated book entitled "A Glimpse of La Fayette, Ind."

Mr. Jack also writes that that city is now remarkably prosperous and offers rare inducements for the location of manufacturing industries. Its growth makes it an excellent point for the establishment of an extensive brick manufactory, there being an inexhaustible supply of first-class brick clay, some of which is located along the line of the La Fayette Belt Railway which connects with four trunk lines of railroads running out from the city in eight directions. Anyone desiring a suitable location for the establishment of a large brick plant will do well to put themselves in communication with the Belt Railway Land and Improvement Co. of La Fayette, and obtain full particulars.

PLAIN FACTS is the title of a little pamphlet devoted to Johnson's patent economical kiln. Those of our readers who are interested and want to become possessed of all the facts in the case can do so by writing to the Somerset & Johnsonburgh Mfg. Co., Somerset, Mass., for a copy.

A **NEW ILLUSTRATED CATALOGUE** has been received from the Standard Dry Kiln Co., of Louisville, Ky. It contains cuts and descriptions of their patent forced draft drier for drying brick, tile, terra cotta, etc., together with a full line of trucks, transfer cars, turntables, etc. and some interesting tables, showing temperature of steam at different pressures and the quantity of vapor or water which air is capable of absorbing. Write them if you want a copy.

TOO MANY WORDS AND NOT ENOUGH SPACE.

There might be an interesting chapter written by some one on "The Courage of Advertisers." It is a quality very highly necessary to good and effective work, and it has often occurred to me that lack of courage as well as defect in judgment is the failing responsible for the overcrowding of advertisements with reading matter. A man gets to be afraid lest his announcement should leave too much unsaid; whereupon, going to the other extreme he spoils his advertising by the use of too many words. Now, it is far easier to use too many words, in advertising as, in any other way, than too few.—*Ex.*

OBITUARY.

Death of Edward J. Hall.

The death of Edward J. Hall occurred at his late home, 452 Franklin street, Buffalo, N. Y., Sept. 24th. The deceased was 64 years of age, and has been identified with the social and business life of Buffalo since 1866, at which time he established the Buffalo Fire Brick Works at Black Rock.

Mr. Hall was born at Wellington, O., his father being the inventor of the first automatic brickmaking machine. While yet in his early manhood, Mr. Hall became associated with his father and brother in the brick manufacturing business—under the firm name of A. Hall & Sons. The concern is still in existence, under the name of the Perth Amboy Terra Company, and managed chiefly by the sons of the deceased.

Death of Uriah F. Washburn.

Once more death has called home a prominent brick manufacturer of Haverstraw, Mr. Uriah F. Washburn.

On the 28th of September, while on his way to Fort Montgomery, N. Y., he dropped dead in the West Shore Depot at Haverstraw.

He was highly respected by all who had the pleasure of knowing him, and in his death the community loses a good citizen and the trade one that was always ready to give good advice, his advice on all matters pertaining to brickmaking being of the best.

He gave strict attention to his business; each day found him on his yard, the same as when he first commenced to make brick for himself.

The different business concerns with which he was connected suffer a great loss. As president of the People's Bank of Haverstraw, he will be sadly missed. Washburn & Co., D. Fowler, Jr. & Son and the Excelsior Brick Company will all feel the loss of his advice.

Uriah F. Washburn was one among a thousand. His word was as good as his bond. He had accumulated a goodly portion of this world's goods in making brick in Haverstraw.

GIRLS ON A STRIKE.

There was a strike at the Hamilton O., Tile works recently.

There are two sets of girls at the works. One set works up stairs, where it is cool, and do glazing work. The other works

down-stairs, where it is hot, and they separate the tile.

For some time the girls down-stairs have wanted to be sent up-stairs for a while. This the management decided to do, and at the same time take the girls up-stairs and put them to work down-stairs.

The girls up-stairs would not go down-stairs and therefore went out on a strike.

When the up-stairs girls did this it was decided that the other girls should remain down-stairs. Thereupon the down-stairs girls struck.

In all about thirty girls went out, and will stay out until some satisfactory arrangements have been made.

PAVING BRICK--A LUSTY INFANT INDUSTRY.

One of the industries of the future, says the *Clinton Age*, will be the manufacturing of paving brick. Only the slightest beginning, in comparison with the magnitude of the business as likely to be developed in two years or less, has been made. Where now one thousand brick are made the demand will at an early day call for a million. What other industry on the continent can show such an increase in product?

It is not a chimerical calculation based on fancy, that we are making. The evidence is positive all about us everywhere in the west, that the paving of the future will be made of brick. The city authorities of Des Moines have just rejected all the bids solicited for paving because it was impossible to procure the brick this season. The committee report if the contractors already busy crowding their work in that city could get 100,000 brick every working day to December 1st., there would be lacking 12,000,000 bricks to complete their present contracts. Hence it is folly to let more contracts, as five of the largest contractors in the country have contracts in Des Moines.

When one considers the hold brick paving has on the public mind, and contemplates the satisfaction that kind of material is giving wherever it has been used, an idea may be had of the magnitude the business of making paving brick will reach at an early day.

It is a well settled fact that vitrified brick surpasses, in every ordinary way, every other kind of paving material in use. It is economical, healthy, durable, pleasant and clean. The streets can be kept smooth and clean easier and

cheaper than though they were of wood or stone. It is in fact the perfect paving.

Still, but few cities comparatively have put down brick paving. The great cities of the west have hardly considered the matter. It will not be long before Chicago, Milwaukee, St. Paul and Minneapolis will be investigating vitrified brick. Investigation invariably leads to its adoption. Its adoption in those cities means a quantity of brick which almost passes calculation.

THE QUIZZICAL BOY AND HIS PROUD PARENT.

In a Brickyard.—A rich man was taking a walk in his brickyard with his little boy one morning, when the following conversation took place:

Tommy—"What sort of a place is this, pa?"

"This, my son, is a brickyard."

"Who does it belong to?"

"It belongs to me, my son."

"Does that big pile of bricks belong to you, too, pa?"

"Yes, Tommy, it belongs to me."

"Does those dirty looking men belong to you, too, pa?"

"No, my son, in this glorious land of liberty there can be no slavery. They are free men."

"Why do they work so hard?"

"I don't know, my son."

"Does any body steal what they make?"

"Of course not, Tommy. How do you come to ask such questions?"

"But pa, don't the bricks belong to those men that make them?"

"No, my son, they belong to me."

"What are the bricks made of, pa?"

"Of clay, Tommy."

"What! Out of dirt?"

"Yes, Tommy."

"And nothing else?"

"No, Tommy."

"Who does the clay belong to?"

"To me."

"Did you make it?"

"No my son, God made it."

"Did God make the clay especially for you?"

"No, I bought it."

"Well, pa, did you buy the clay from God?"

"No; I bought it just as I buy anything else."

"Did God sell the clay to the man you bought it from?"

"I don't know, Tommy. You ask more silly questions than I can answer."

"It's a good thing you own the clay, aint it pa?"

"Why, Tommy?"

"Because if you didn't you would have to work like those dirty men. Will I have to work when I get to be a man?"

"No, I will leave you all my property when I die."

"When these men die, won't they all turn to clay?"

"Yes; we all turn to clay when we die."

"When are you going to die, pa, very soon? I was thinking what a nice lot of bricks you would make when you were dead."—*Mount Desert Herald.*

STANHOPE.

STANHOPE and James Gordon Bennett had confidence in the Haffkine preventive of cholera as supported by Pasteur. Stanhope having taken the preventive placed himself in ward F. of the cholera pest house in Hamburg, sleeping in the bed in which a patient had just died of the plague, with the blankets of another victim for his covering, and otherwise exposed himself to the dreaded disease in order to establish their claims.

Stanhope and Bennett were not more confident of success in their undertakings than are we, that we will soon be able to prove to the burners of clay, that we have the best clay burning kiln yet invented. Stanhope may yet die and his efforts prove abortive; we have many witnesses to survive us.

We think the Columbian Exposition the proper place to prove our claims; therefore, if any intending exhibitors wish to put a burned product before the visitors we would be glad to correspond with them; we wish to furnish the kiln. We will also be thankful for any information regarding space, etc., at said Exposition. Address,

STEWART BROTHERS,
Mt. Victory, Ohio.

We hear from Woodford county, Ill., that the demand for tile is good after a wet season. At Secor the tile works which burned in 1890 has been rebuilt and is again in operation. At Minonk new works are being built to replace the ones burnt in March. At Eureka Gudeman Bros., the brick and tile firm, are now using crude oil for burning and as fuel for boilers. Same firm has also placed a large new Corless engine in their works.

EDITORIAL NOTES and CLIPPINGS.

PERSEVERANCE WINS.

The constant drop of water
Wears away the hardest stone;
The constant gnaw of Towser
Masticates the toughest bone;
The constant cooing lover
Carries off the blushing maid,
And the constant advertiser
Is the one who gets the trade.

—Exchange.

Watson, Pa., is to have a brick yard.

Slidell, La. is to have a new brick plant.

A tile factory is being erected at Eldora, Ia.

Jason Densmore is making brick at Lebanon, N. H.

Dubuque, Ia., is to have a large paving brick plant.

Law & Deveney are again making brick at Chester, Pa.

The Markle (Ohio) Fire Clay Co., are enlarging their works.

Coalburgh, O., it is claimed, is an excellent site for a brick plant.

A sand brick manufactory is to be established at Muskegon, Mich.

Adam Weber will erect a fire brick factory at Perth Amboy, N. J.

Janesville, Wis. offers advantages for the establishment of a brick yard.

The Brewer (Me.) brick manufacturers have had a very prosperous season.

New Haven, Conn., is to pave one of her thoroughfares with vitrified brick.

There was an \$18,000 blaze at the pottery of Geo. Brooks at Orrington, Me., Oct. 1.

Subscribers are especially requested to mention the Clay Worker when writing to advertisers.

The Laprairie Pressed Brick & Terra Cotta Company, Montreal, P. Q., has been incorporated.

Logan & Sons are putting a Huyett & Smith steam dryer in their brick works at East End, McKeesport, Pa.

Shields & Alexander's brick works at Durango, Colo., were burned Oct. 1. Loss \$16,000. Insurance \$10,000.

The Salem, Garfield Mining Co., Goshen, O., will put an improved repress machine in their brick works.

A large paving brick plant will probably be established at Boone, Ia. Some Des Moines capitalists are interested.

Brick works will be built at Ansley, Ala., by C. W. Jackson.

Isaac A. Black, of Mead Run, an experienced brickmaker, will establish a brickyard at Kane, Pa.

If you want anything you haven't got or have something you don't want, read or advertise in our "Wanted, For Sale, Etc," columns.

Springfield, Mass., has begun paving her streets with brick, furnished by the N. Y. Brick & Paving Co., Syracuse.

The Massillon (O.) Stoneware Company's plant near that city was burned the 20th ult. Loss \$20,000. Insurance \$8,000.

James Howie, Albert Ney and other Dubuque, Ia. capitalists are going to build large brick works near North Dubuque.

A syndicate of Philadelphia and Camden capitalists have leased a factory at Pleasantville to abstract aluminum from clay.

Menominee, Wis., is to have another brick yard to cost about \$100,000. Her present output of brick is about 20,000,000 a year.

A change of name: The Architectural Terra Cotta Co. of Perth Amboy, N.J., has changed its name to The Standard Terra Cotta Co.

Louis De Rosay, for many years prominently identified with the manufacture of brick in North Cambridge, Mass., died Sept. 30.

The Kelly Brick and Tile Co. is now making brick at Thompson, Minn. They intend to put in two additional machines next season.

Mc. Cord Bros., Martin's Ferry, W. Va., have unearthed a fine bed of clay and will probably organize a company to establish brick works.

East Peoria Paving Brick Company, Peoria, Ill., has been incorporated; capital stock, \$200,000; incorporators, Hugh M. Fleming, Julius S. Starr and Deloss S. Brown.

The Central City Brick Co., Syracuse, N. Y., has been incorporated by Chas. N. Brown, C. M. Magee, C. H. Price and others. Capital \$42,000. The works will be built at Kirkville.

Geo. L. Allen Cordowan by Millerston, Glasgow, Scotland, desires catalogues of clayworking machinery, dryers, kilns, etc. He is especially interested in paving brick.

The United States Encaustic Tile Company, of Indianapolis, is unable to keep up with their orders, though they are running a day and night force. Last week the company received an order from Winnipeg, and shipped one carload on the order at once.

Ferguson & McCord's brick and tile works at Benton Harbor, Mich., were burned Sept. 19. Loss \$10,000. Insurance \$7,000. Rebuilding. This is their second experience, the works having been destroyed by fire in January, '91.

Hyde Park Brick Company, Leechburg, Armstrong county, Pa., has been chartered, capital, \$10,000. They will manufacture brick, fire brick, tile and other articles from clay or shale substances. Directors, W. W. Fisens, G. B. Dougherty, Kittanning; Henry Shaeffer, Whitisburg.

E. D. Baker, 379 Bond St., Cleveland, O., is looking for a desirable location for a press brick manufactory; would prefer to locate on the line of the L. N. A. & C railway in southern Indiana. Any one knowing of a deposit of suitable clay in that locality is requested to communicate with Mr. Baker.

Vandalia Line gives notice that their mileage books, and those of Cincinnati, Hamilton & Dayton R. R. Co's. issue and Pennsylvania Lines west of Pittsburgh issue, which have heretofore been good over the other portions of the Vandalia Line, will be honored on their Peoria Division also.

Our Philadelphia correspondent writes that W. H. Skinner, of St. Johns Newfoundland, has been in the city of brotherly love for several days arranging for the establishment of a large plant for the manufacture of bricks at St. Johns. During the summer there was a large fire that destroyed about two thirds of the city which was of wood and the residents are determined not to take such chances again.

In all our travels we have seen no city that has grown so fast, and has so many large and fine business blocks and handsome residences as Denver, Colo. The growth of this city is truly magical. The quality of brick used and made in Denver equals those in any eastern city, and stone of every kind is found in great abundance in the mountains near by. It is not uncommon to see the new business blocks and hotels wainscotted with onyx and many new varieties of marble, and in every point

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ANTHONY ITTNER,

MANUFACTURER OF

ST. LOUIS AND BELLEVILLE PRESSED AND ORNAMENTAL BRICK.

OFFICE ADDRESS:

ANTHONY ITTNER, Builders Exchange, Telephone Bldg., St. Louis, Mo.
St. Louis Works, California Avenue Belleville Works, L. & N. R. R. near
and Sidney Street. Belleville, Ill.

Fine Press Brick, 10,000,000	Total Yearly
Ornamental " 2,000,000	Capacity:
Common Press " 15,000,000	27,000,000.

Our Press Brick have sharp and well defined angles, and are free from the objectionable mark or streak, so frequently seen running lengthwise through the face of the other dry clay brick, and commonly called "granulation."

The color of our brick being a beautiful dark cherry red, equal to any manufactured in this country.

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We also have a PATENT REVOLVING UPRIGHT STEEL BRUSH PULVERIZER, which leaves the clay loose and flaky, a condition so favorable for making a solid uniform homogeneous brick, which, under the trowel, can be cut into any shape without breaking.

Ours is the only DRY CLAY Brick Works in the United States that harvests and gathers the clay in its depth, thus securing a standard, uniform brick, year in and year out, continuously.

The results of the above advantages are accounted for and seen in the following certificate, which speaks for itself:

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GENTLEMEN:—We have carved the brick panel you sent us and ship same to you this day. Although we have had a large experience in brick carving, we do not hesitate to pronounce your brick the best for carving purposes that we ever used. Yours truly,

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It is pretty generally conceded that wonderful progress is being made in the ancient and heretofore unprogressive art of brickmaking. Among the best evidences of this is the fact that the brick-making craft is no longer without a literature of its own. There are now some good practical books treating on the manipulation of clay—the making, drying and burning of brick. The list is not so large but that every brickmaker can afford to have them all. Get them and read them.

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"BRICKMAKING AND BURNING,"

J. W. Crary, Sr., 2.50

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Alfred Crossley, 1.00

"DURABILITY OF BRICK PAVEMENTS,"

Prof. I. O. Baker, .25

Mailed, postage free, on receipt of price. All of them to one address for \$5.50. Address the publishers, T. A. RANDALL & Co., Indianapolis, Ind.

THE CLAYWORKER.

THE OFFICIAL ORGAN OF THE NATIONAL BRICK MANUFACTURERS' ASSOCIATION OF THE UNITED STATES OF AMERICA.

VOL. XVIII.

INDIANAPOLIS, IND., NOVEMBER, 1892.

No. 5

Written for the Clay-Worker.

POLYCHROME CLAY WORK.

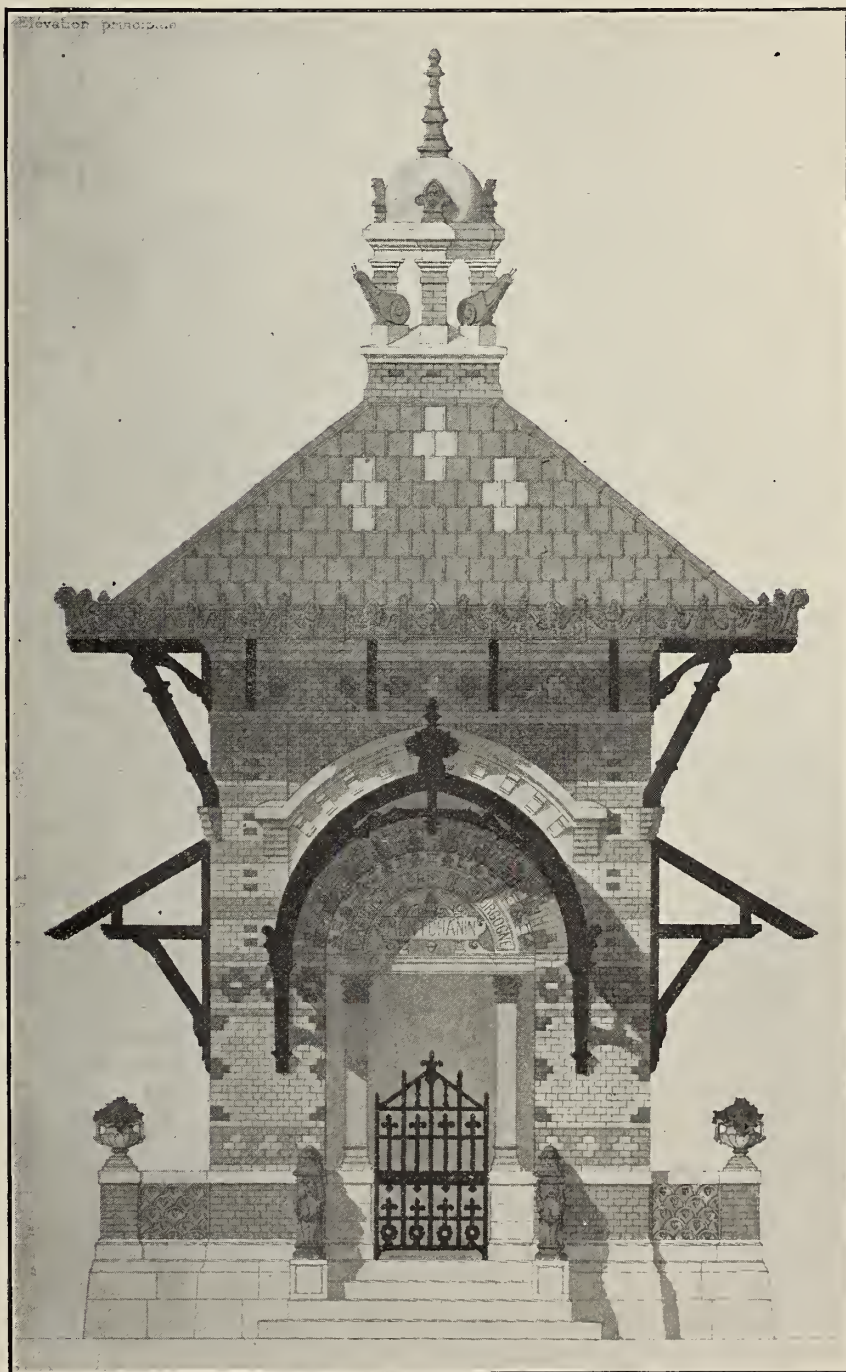
To be successful we must be cosmopolitan. As clayworkers, we are not Americans. We are of the earth. We may draw our inspiration from the whole world. As Americans we have our own individual and American requirements. We influence the plan of our structures and measurably the way in which they are put together. As to the decoration or as to that part which affects the appearance, we may draw from the world. We go to France and we take from them that which may naturally be adapted to our physical requirements. Our great office buildings, our court houses, our business structures, are influenced in their plan and in general arrangement, by the character of the business which is done in them. Our court organization is distinct and separate from that which belongs to any other country. The details of county, state and city government, are different, that calls for the building of the different plans assuited to the requirements of the courts and various public officials. These requirements determine definitely what we want from the standpoint of planning and measurably of structure. When it comes to the clothing of such

a building, its decoration, as suggested above, we may draw from the world. It is our duty so to do. The architect who plans a house in an American city is frequently met with the question from his client: "Can you show me anything

like this in our town?" The architect feels that he does not like to limit himself in the inspiration of his own neighborhood particularly when that section is not distinctively artistic. These things are constantly coming up, but

with the proper handling of such a situation there is no difficulty in bringing about the proper understanding. The client may be made to know that we in our newness must draw constantly from the outside to avoid repetition.

Our illustration is the front elevation of a tile manufacturer's building at the Paris Exposition of 1889, and shows a very delicate and artistic sense in the arrangement of clay products. We are not able to show the variation in color, though the picture represents fairly well the distinction in color values. The body of the structure is in yellow brick and the decorative work in varying shades of red and blue. The terra cotta is yellow the tiles are red, and the figures which show light in the roof are green. The gutter moulding is terra cotta of the same shade as the roof and a close examination will show it to be particularly attractive. The wood work, brought in contrast with the brick, is painted a very dark reddish brown. In that way it has its distinctive quality; the effort being made to



TILE MANUFACTURERS' BUILDING AT THE FRENCH EXPOSITION.

separate the wood in its appearance from the brick and to indicate clearly the absolute distinction in the character of the material. This is honest and effective.

It is misleading to speak of the name of the various colors of the brick used in this composition. When we mention a red brick as being red; or blue, or green, the mind necessarily reverts to the primary colors. The success of this work is in the selection of the shades of colors named. Blue and green are not expected to go together. However, with the proper shades of these colors in the proper relation, and surrounded with other colors, they may be handled very effectively. One reason that polychrome or many colored brick work has not been successful with us is, that we have not brought the right kind of attention or skill to bear upon the selection of color or shade. When a multiplicity of colors are used they must be used successfully, or the result of the work reflects to the discredit of the clayworker. People say: "We do not care to have colors used in connection with brick buildings, excepting one color possibly, that of red." However, if they see color successfully used, they change their minds and the result is a high standard of artistic brick work and an increased demand on the clayworker for the production of this kind of material. Good work of any kind in this field, advances the standard of the clay world. Thus it is that we suggest that it is our business to draw our inspiration from the world; to be cosmopolitan; to take the best ideas from all people; to look over the world and find that which may be used naturally, properly without strained efforts, for the decoration and advantage of our American structures. Decoration as used in this sense does not imply a loading with ornament. It means adapting the proper methods and the proper forms to add interest to the constructional forms. We require plain surfaces to correspond with those which are not plain. We require modest, plain colors, those which are neutral in character, to bring out and emphasize those which are more vivid. It means the proper contrast of the different parts. In the decoration of this building we find a plain, simple molding at the base, yet giving a proper decorative effect for that part of the structure. We find that as the work advances it becomes more light and distinctively ornamental in effect. We

have the heavier forms at the bottom, and as we advance, the work becomes lighter and freer and naturally adapted to its proper position.

It is to be hoped that we will not have any more polychrome brick work done in our country until it can be done right.

We see around us, in railway stations, school buildings and other structures where colored enamel brick has been used, that they have been put in without any regard to their proper color relation. Their blues are distinctively blue; the reds and bright reds, and the greens which are green, and the browns which are dark browns, and the whites which are glaringly white, are thrown together in a very disturbing manner. This is bad. It is bad for the reputation of the man who makes the brick. People say glazed brick are not pretty. They say the combinations are offensive, and this re-acts on the man who makes the brick. Now, if these colors could be properly used, in harmony, the public would form a very high estimate of enameled brick, not only as to their serviceableness, but as to their artistic qualities. They would say: "We put this in our buildings because it is pretty." Because it is altogether the best thing that we can do, and thus the clayworker would be benefited in his pocket-book, than which nothing could be more satisfactory.

GIVE IT A POINT!

NEWSPAPER and magazine advertisements should be like a cambric needle—short, sharp and pointed. Do not start with a long introduction or useless words and sentences, but with a few well chosen words, and with suitable illustration or heavy display lines make it distinctive enough to catch the eye of the casual reader while hurriedly turning the pages, and with a loud, appealing voice cry out to him above the din of editorials and other advertising matters, and hold his attention for the moment. Do not advertise spasmodically; it only wastes your money. A jingling rhyme is a bright way to advertise; it is readily committed to memory and leaves such an agreeable taste in one's mouth after trying to swallow those large, black advertising "pills" found in so many publications. One does not commit prose to memory; if it is not seen time and time again it is soon forgotten.—*Fame*.

Written for the Clay-Worker.

CLAY AS A MINERAL IN LAW.

CLAY is defined in the American and English Encyclopedia of Law as a soft earth which is plastic, or may be molded with the hands, consisting of alumina, the characterizing ingredient to which it owes its plasticity, and silica with water. It is the result of the wearing down and decomposition in part of rocks containing aluminous minerals. Minerals are, according to the authority of Anderson's Directory of Law (1888), that which is mined. Though frequently applied to substances containing metals, in its proper sense the term includes all fossil bodies or matters dug out of mines. In its enlarged sense, it comprises all the substances which form, or have formed, part of the solid body of the earth, both external and internal, and which are now destitute of, and incapable of supporting, animal or vegetable life. Both Bouvier's and Black's (1891) Law Dictionaries, have for their primary definitions, all fossil bodies or matters dug out of the mines or quarries, whence anything may be dug; such as beds of stone which may be quarried. Mr. Cochran, in his terse Student's Law Lexicon, says, that the term mineral, in its widest sense, includes any substance, being part of the earth, which can be got from underneath its surface, for the purpose of profit, whether (a) by *mines*, or, underground workings, or (b) by *quarries*, or open workings.

The definition of a mineral as that which is mined, brings up the question, which first agitated the Court of King's Bench in England over a half century ago, as to what is mining. Lord Tenterden decided in *Rex v. Sedgley* (2 Barnewall & Adolphus's Reports, 65) that where limestone was obtained and raised by sinking shafts perpendicularly down to the stratum and the stone raised to the surface by machinery or carried underground to a tunnel (which was the mode used in obtaining coal and ironstone), that it was mining, and the place from which it was so taken was a mine. If the existence of metal be necessary to constitute a mine, he said, salt works, from which salt was obtained in the way that this stone was taken, would not be mines, nor, indeed, would coal works be mines, though, in the statute itself, they were so called. To deny the character of a mine to the

works in question would be to depart from the ordinary and proper meaning of that word in the English language. This reasoning was followed by the same court in the later case of *Rex v. Brettell* (3 Barnwall & Adolphus's Reports, 424) where it was held that clay pits were clay mines, not only because of the way that they were worked, but apparently also on the account of the substance mined, though Lord Tenterden, also sitting in this case, and three others of the justices seemed to think that the mode in which the commodity was obtained, and not its chemical or geological character, should determine whether it was a material or not.

Without doubt, what may be called the leading English case on the question of what are minerals, is that the Earl of Rosse *v. Wainman*, (14 Meeson & Welsby's Reports, *859,) decided by the Court of Exchequer in 1845. That case arose out of these conditions: Certain waste lands in the manor of Shipley, to the soil of which, and everything constituting the soil, the lord of the manor was entitled, where, by an Enclosure Act of George 3, taken away from the lord and allotted to commoners, except that there was reserved to the lord all mines and minerals, of what nature or kind soever, lying and being within or under the said commons and waste grounds, which he might have, hold, win, work, and enjoy exclusively within and under said commons and waste grounds, with full liberty of digging, sinking, searching for, winning, and working the said mines and minerals, and carrying away the lead ore, lead, coals, ironstone and fossils, to be gotten thereout, provided that the lord in the searching for and working the said mines and minerals should keep the first layer or stratum of the earth separate and apart by itself. On one side, in favor of the lord, it was contended that the word "fossils" would surely include stone. The definition of "mines, minerals, etc., in Tomlins' Law Dictionary was quoted as quarries or places where anything is digged." Dr. Johnson was also cited as defining a mine to be a place or cavern in the earth which contains metals or minerals and as defining a mineral to be a fossil body; matter dug out of mines; all metals are min-

erals, but all minerals are not metals. On the other side, it was said that a mine was a sub-terraneous working, and clay, if got low in the earth, might be called a mine, but not if near the surface. Whether or not a place was a mine, would depend on the mode of working it, and it must be sub-terraneous. Then the court asked council if the lord's right to a mineral was to depend on the mode of working it. The reply was, a mineral is something which comes out of a mine. All stone is part of the mineral kingdom, and if the lord's construction of this reservation is right, he might take gravel and clay. The



JAS. W. GILLIES, BRICK MANUFACTURER, HACKENSACK, N. J.

opinion of the court, from which clearly Bouvier, Black, and others, get their definitions of minerals is pointed. The term minerals, though more frequently applied to substances containing metals, in its proper sense includes all fossil bodies or matters dug out of mines. Beds of stone, which may be dug by winning or quarrying, are therefore properly minerals, and so it should be held in the clauses of reservation in question, bearing in mind that the object of the act was to give the surface for cultivation to the commoners, and to leave to the lord what it did not take away for that purpose.

Ten years later the High Court of

Chancery in England decided the case of *Darvill v. Roper* (3 Drewry 294). Here there was an agreement for a partition of lands, and in the deeds carrying out the agreement, the mines of lead and coal and other mines and minerals were excepted. Professor Ansted, Dr. Ure and Mr. Tennant, well known scientific chemists and mineralogists, agree in their testimony in defining minerals to be any crystalline or earthy substance, whether metalliferous or otherwise, existing in or forming part of the earth, and of which might be worked by means of a mine or quarry. The Vice-Chancellor, delivering the opinion of the court, gave four definitions of the word minerals. (1). The scientific meaning, already stated, which would include every portion of the soil, not merely the limestone rock, but the gravel, the pebbles, all, even to the very substance of the loam or mould which form the soil. (2) The more frequent, though it therefore by no means follows, the necessary sense, is that of metalliferous substances. (3) All such substances as are dug out of the earth by means of a mine, a meaning which without being opposed to the other sense, is in accordance with the derivation and etymology of the word; for what may be the origin of the word mine, minerals is clearly derived from mines. A mineral is etymologically, properly a substance dug out of the earth by means of a mine. (4) The meaning of local usages. And a local usage as to the understanding of a word well established, without conflicting evidence, is always to be regarded in consid-

ering any particular case. Discussing the second definition he said that if they had found a stratum of fire clay, or porcelain, worked by means of a mine, he did not see that that would not be included, although those are clearly not metalliferous substances. He then said that one settled rule in interpreting contracts was this: If there be any uncertainty as to the meaning of a particular term, you are to give it its primary, its ordinary meaning. And the question here was as to what was the ordinary meaning; certainly it was not the scientific meaning; and he did not see any reason for coming to the conclusion that it must be confined to metalliferous ores. So

far from there being any authority for holding that a mineral is any crystalline or earthy substance worked in any manner, there is authority to show, first that mines and quarries, are different, and that being established, then that the term minerals as used in this particular contract, or deed, could be used only in the sense of those minerals which could only be worked by means of mines, that is, by underground diggings.

Next in point of importance among the English cases is that of the *Midland Railway Company V. Checkley*, decided by the Master of the Rolls in 1867 (4 Law Reports, Equity Cases, 19.) The question was, whether stone used for road-making and paving, which lay about 30 feet below the surface of the ground, was a mineral. The Master said that stone was, in his opinion clearly a mineral; and in fact everything except the mere surface, which was used for agriculture purposes; anything beyond that which was useful for any purpose whatever, whether it was gravel, marble, fire clay, or the like, came within the word mineral, when there was a reservation of the mines and minerals from a grant of land. He also thought that such reservation included the right of quarrying as well as underground mining.

China clay received special attention in the case of *Hext V. Gill* (3 Moak 574). In 1779 the Duke of Cornwall, made a grant, reserving all mines and minerals within and under the premises, with full and free liberty of ingress, egress, and regress, to dig and search for, and to take, use, and work the said excepted mines and minerals. China clay was apparently not known to the parties at that time. Afterwards there was a bed of it discovered under the land conveyed, but it could not be gotten without totally destroying the surface of the land. Under these circumstances, the Court of Chancery (English) held that the weight of the authorities was that a reservation of minerals included every substance which could be got from underneath the surface of the earth for the purpose of profit, unless there was something in the context or in the nature of the transaction to induce the court to give it a more limited meaning. Putting the word mines before minerals did not restrict the meaning of the word mineral. China clay was therefore included in the reservation, though unknown when the deed was executed; but under the

circumstances the owners of the clay would not be permitted to destroy or seriously injure the surface of the earth without making some arrangements with the owners of the surface permitting them to do it. Following this decision is the statement of one of the lord justices that but for the authorities he should have thought that what was meant by mines and minerals in such a grant was a question of fact what those words meant in the vernacular of the mining world and commercial world and land-owners at the end of the preceding century (the case being tried in 1872), upon which he was satisfied that no one at that time would have thought of classing clay of any kind as a mineral, which statement concedes everything for any kind of clay.

Bainbridge, on the Law of Mines and Minerals, which has been republished in America with approval, says that a mineral has been defined to be a fossil, or what is dug out of the earth. The term may, however, in the most enlarged sense, be described as comprising all the substances which now form, or which once formed, part of the solid body of the earth, both external and internal, and which are now destitute of, and incapable of, supporting animal or vegetable life. In this view, it will embrace as well the bare granite of the high mountain as the deepest hidden diamonds and metallic ores. In deeds and other documents the term may be explained in its larger or restricted sense, according to the intention, expressed or implied.

The Attorney-general of the United States, addressing the Secretary of the Interior, August 31, 1872, (*Sickels' Mining Laws and Decisions*, 485) quoted with approval the above definition and applied it, in the case before him, to deposits of diamonds, they not being specifically mentioned in the act of Congress providing for the entering and patenting of mining claims.

Mr. Wade, in his *Manual of American Mining Laws*, goes farther and says that in addition to the valuable minerals specially mentioned in the act of Congress, as giving a mineral character to the public lands thrown open to exploration and purchase, the following have been held to be included in the general term of the statute, and when found in deposits, to render the land on which they are discovered subject to occupation and purchase under the mining laws; iron, whether found in lodes or

placers, diamonds, fire clay, kaolin, marble, limestone, mica, slate, umber, petroleum, borax and salt.

The authority on which Mr. Wade classifies fire clay as a mineral, is a letter written by the Commissioner of the General Land Office, July 10, 1874, in which the latter stated that lands valuable on account of deposits of fire clay might be patented by compliance with the mining laws. (*Coop's U. S. Mining Decisions*, 209.) For the kaolin he depends on a letter of the Commissioner's, dated June 28, 1875, in which the latter stated that lands containing valuable deposits of kaolin might be patented under the mining act. Here is also to be found his authority for including limestone and marble. (2 *Coop's Land Owner*, 66).

The Court of Chancery of New Jersey, in the case of *Hartwell V. Camman* (10 N. J. Equity Reports, 128), in 1854, applied about the same principles as those which have been established in England by the development of natural and systematic reasoning. In this case it was held that a grant of mines and minerals did not embrace everything in the mineral kingdom, as distinguished from what belonged to the animal and vegetable; nor was such a grant confined to any one of the subordinate divisions into which the mineral kingdom is subdivided by chemists. Paint stone had been found in strata below the surface of the soil and distinct from the ordinary earth. Professor Doremus, the only scientific witness examined, said that it might be called an argillaceous sandstone, alumina and silica being the prominent ingredient, it was not an ore of iron. It came under the head of argillaceous rocks, and he wishes to distinguish these classes from ores or metalliferous rocks. The position of this paint material, as it lay in the mountain, was not in veins, but in strata, and the extracting of it, as he saw it there, would not be called mining. The court said that it did not think that the term minerals should be confined to the metals or to metallic ores, and that paint stone was a mineral and passed by the grant of minerals. To support this conclusion, it was noted that it was a body destitute of organization, and naturally existed within the earth. Two definitions were also quoted, one from *Bakewell's Mineralogy*, that the term mineral, in common life, is generally applied to denote substances dug out of the earth or obtained

from mines, and the other from Cleveland's Mineralogy, that minerals are those bodies which are destitute of organization, and which naturally exist within the earth, or at its surface.

In the reports of the Geological Survey of the state of Pennsylvania, the mineral products of the state are classified as petroleum, coal, natural gas, building stone, flagstone, building brick clay, fire clay, limestone, iron ore, mineral paint and mineral water. (Book R. page 79). And the Supreme Court of Penn. in the case of Dunham and Shortt V. Kirkpatrick (101 Penn. State Report, 36), decided in 1882, said, it is true that petroleum is a mineral, no discussion is necessary to prove this fact. But salt and other waters, impregnated or combined with mineral substances, are minerals; so are rocks, clays and sand; anything dug from mines or quarries; in fine, all inorganic substances are classified under the general name of minerals. The court, however, refused to include petroleum in a reservation of minerals, because to do so they thought would make the reservation as extensive as the grant, and therefore void, besides which, they were sure the parties did not intend to reserve mineral oil, which might afterwards be found in the land, otherwise that intention would have been expressed in no doubtful terms.

It is clear from the foregoing, that in the English law, clay is a mineral, and would be so held in construing contracts or legislative acts, unless it is very specifically excluded by express statement, or what would amount to it.

The States of the Union having acquired the great body of their common law from England, and respecting as they do the decisions of the English courts, where express statutes or different environments do not make them inapplicable, there can hardly be a doubt but that the law of England, as above outlined, must be adopted as the law of the United States, or any of the individual States, when the question shall arise in the courts here as to clay being a mineral. The leading dictionaries of America law recognize this, as shown by their definitions, as also do the several writers quoted, while there has been no decision to the contrary rendered in this country.

Written for the Clay-Worker.

HINTS ON BRICKMAKING.

No. 69.

BY R. BRICK.

HANDLING CLAY.

BEFORE we can decide the method of getting clay out of its bed, and to the machine, we must consider depths of clay and distance to move, as well as quantity to be handled per day. Where machines are within a few feet of clay, and near the same level, there is no better or more economic method than a good strong man with a pick, shovel and a tray barrow.



CHAS. S. PURINGTON, PRES PURINGTON BRICK CO., CHICAGO, ILL.

Where the distance does not exceed twenty-five to thirty yards he can pick, shovel and roll into machine per day, from 5,000 to 6,000 bricks. Beyond thirty yards, a horse and dump cart is best. Where clay is twenty to forty feet below level of machines, an incline track with dump cars and steam hoist, is much better than either of the above methods. Power for the hoist can come from a steam hoisting engine, or, the drum can be operated from the line shaft, driven by the same engine that drives the machinery. Any machine shop-man can arrange this hoist. These are the three methods in general use to move clay from bank to machine. The best and cheapest mode of getting clay

into the car, or cart, where the clay is from five to ten or fifteen feet in depth, for wheelbarrows or carts, or even cars, is the usual way of cutting under at bottom with pick, then by driving a heavy crowbar down from the top, forming a line of holes parallel with face of bank, and back just as far as the trench has been cut under bottom. The block of clay is thrown down, and is ready to break up and shovel into cart or car. Where clay bank is ten feet or more in depth, the very cheapest method is to cut the face of the bank sloping at an angle that will allow a team of horses to pass over it; then use a plow cutting

horizontal furrows, plow the whole face of bank from top to bottom, then with scraper take it to the machine. In this way the clay can be mixed from bottom to top, same as if thrown in "falls."

Where the distance to machine is too great, or if machine is in accessible, and cars and tracks are used, at a convenient point, build a platform over the track with a hopper in it, run the car underneath, then drive over the platform and dump into the car direct from scraper. This puts clay from bank to machine without using either pick or shovel as it is entirely practical and breaks the clay up and mixes the stratas. A steam shovel does the same thing, and is the most economic of all methods, where the quantity to be handled per day is large enough. A leading brick manufacturer who uses steam shovels, advised the writer, that in his opinion, they were not economical where less than one hundred thousand bricks per day were

handled. Since that time, however, there has been improvements made, and cheaper steam shovels are now manufactured, so that it might pay where fifty thousand or even less number of bricks per day were made. The brickmaker must consider his means, depth, and nature of his clay, amount to be moved, distance to be moved, and number of feet it must be elevated to reach the machine. If the clay is to be brought and dumped into a soak pit, and be wet and given time to dissolve or "soak," as it is called, then it does not matter so much the condition it is in when it leaves the bank. If on the other hand, the clay comes direct from the bank and is dumped into the

machine, and goes to the drying floors or tunnels, ten minutes after it is mined, then it does make a difference in what condition it leaves the bank. It must either be in proper condition, or it must go through crushers or disintegrators and pug mills, before it reaches the machine, for it has no time to dissolve by contact with water, as clay absorbs, as well as parts with water, very slowly. In winter and spring, and when there is much rainfall in summer, clay may be in fair condition in the bank, but in summer, when there is little or no rainfall, it becomes dry and hard in its bed. The best plan then, is to water it before it is loaded on car or cart. This can be done by running a line of two inch pipe to the clay bank. Then, by the use of blasting powder, the clay can be loosened so that it will receive water. It should be blasted and watered at least two days before it is hauled in. This gives the clay time to absorb the water and puts it in proper condition to be crushed and made ready for the machine. The details of the operation of blasting clay, has appeared in previous articles in the CLAY WORKER, and only the general idea will be given here.

If your bank is ten feet deep, bore a line of holes with a two inch augur, parallel with face of bank and ten feet back from the face, twenty feet apart; put into each first, one half of a dynamite cartridge, with a short fuse, say twelve inches long, drop it in then with a light rod, see that it is in the bottom. This "pop shot" will form a nest for the half keg of powder to be used. Next pour in the powder, then insert eleven feet of fuse, with its lower end in a percussion cap, and with a rod put cap and fuse into the powder, then fill the hole with dry dust, tamping it firmly around the fuse to the top, light the fuse and retire to a safe distance. When the powder explodes, if the work has been well done, the earth will be lifted up just a little and show cracks on the surface for a distance of twenty feet from the bank. The face of the bank should not be disturbed, so that it will hold the water that is poured into the loose earth.

In this way clay can be kept in good condition, and saves more than powder costs, in picking and breaking up lumps of hard clay, and is about the only way to get clay in proper condition where it goes direct from the bank to machine and into the dryer.

THE CLAY-WORKER costs but \$2.00 a year if paid in advance.

Written for the Clay-Worker.

WHAT SUGGESTED DOWN DRAFT KILNS.

Old Errors Undiscovered Often Suggest New Ones. How Brick Must Be Set to Equalize Heat in a Kiln.

BY J. W. CRARY JR.

FROM time immemorial, errors of all kinds have been practiced; and perhaps nothing in the mechanical line has been more persistently practiced, than has unreasonable, and it may be said, stupid "brick-setting." Ever since my recollection of "brick setting," the "benches" and "overhangings" of "arches" in kilns, and the "binding courses," were set so that it was impossible for the fire to pass freely, up through the kiln. The spaces between the under course of brick was always covered, by setting the upper course so that the "joint," as it was called, would be "broken," leaving no possible escape for heat or smoke, up through the kiln, only by the scant openings at the ends of the brick, or by some lucky chance opening, not intended by the "Setter." In fact, it was thought necessary to "break the joints," by putting one brick right on the space between the two; so that the brick would "set steady," and setting look nice. Then the whole body of the kiln, would as a rule, be set too close; one half inch space between the brick, or "three over three" being the rule.

THE SCIENCE OF DRAFT AND HEAT was never thought of. It was enough to know that it was the "old way," and the old way must be right, else our daddies would not have kept it going on perhaps ever since Noah, had the first kiln burned. Indeed, it is quite reasonable to suppose, that brick were "set," about as we moderns have set them, before Noah's time, or else by some of his early descendants, before they settled on the plane in the land of Shinar; for when they got there they wanted to make a big show, they had the Chicago idea, they wanted to build a tower that would reach to heaven, and only differed with Chicago in the financial feature of the enterprise, as Chicago is not reaching for heaven, but for the pockets of all the world. But Noah's stock, knew a great deal about brick. They knew that "Salmon" brick would not do to build that tower; and further, that it would be fooling away time and money, to set and burn brick, as their

fathers had done; so they said, "Let us make brick and burn them thoroughly," and doubtless they did it by setting their brick, so that a free, strong draft, and combustion of fuel was had in their kilns, and hence, with proper skill they were burned "thoroughly." With the "confusion of tongues," good setting and burning became a lost art, and our old daddies having never found it, took up the most primitive idea, and handed it down to us, and now we set brick as though we were afraid that the fire would run up, and spread all through our brick kilns, and perhaps burn them too hard, or burn them all up.

LET'S SEE IF WE CAN IMAGINE HOW THEY "BURNED BRICK THOROUGHLY."

Many years ago I began to study how it was, that those Shemites could burn their brick "thoroughly," and I said to myself, well, they must have set the bottoms of their kilns loose, so that a free, strong draft would be established as soon as the fires in the "arches" was fairly started, and after dreaming about one of those kilns, that was laid up in that "Tower of Babel," I tried to imitate the old "setter," that was a "Crack Boss" in one of the Shinar brick yards, his presence was so vivid in my dream that I could see his every move, he did not look like a Philadelphia or Baltimore "setter," or any other setter I ever saw. He had a thoughtful, studious, intelligent look, and his manner and appearance was so attractive and agreeable, that I ventured to introduce myself. I told him that I had taken the liberty to look at some of his burned kilns, and that they appeared to be burned even and *hard*, throughout, that the brick near the top of the kilns, seemed to be just as hard as the brick at the bottom; and that the only difference was, that the brick in the "arches," directly exposed to the fire, were glazed at the ends. "O yes," said he, "that's the way we burned brick to build the great tower, but when our language was confounded and our people dispersed, the true art of setting and burning brick was lost, and so you *moderns* have followed the same methods that grandfather Shem, and his boys had, for setting and burning brick. I will show you with pleasure the true secret of our success, in setting and burning brick, and it is lucky for you that the good Lord sent you off here (in spirit), just in time, to catch the true idea of setting and burning brick, before the "dispersion," for neither myself or others will

be able to teach the moderns, after the *stampede* to which we are doomed.

THE GHOST, SHOWING AND EXPLAINING ONE OF HIS KILNS.

He took me to a kiln, out of which brick were being hauled. It was a beauty. The brick were hard, and of uniform color from bottom to top, excepting the "arch brick" which were glazed where they had been in contact with the flame and gases from the combustion of fuel. My ghost friend did not give me any scientific reason for thorough burning, (like brick burners now, I do not think he had bothered his head with science) but he went straight to the common sense idea of the thing, and waving his hand toward the kiln, he said in a very pleasant and impressive tone, "you see that I have the brick set very loose and open at the bottom of the kiln, and as I get nearer to the top I set the brick a little closer. When I get to the top of the kiln I put a course of brick flat, about one inch apart. You will observe that the brick are set in a zig zag position, (you moderns call it "skintling,") no two courses on the same horizontal line are set end to end together, so you see that the fire and smoke, not only goes up through the openings at the sides of the brick, but also at the ends, thus giving a strong free draft, all round every brick, clear up and out of the top of kiln.

NOW I WILL GIVE YOU MY WAY OF BURNING MY KILNS.

I have, as you see, a good permanently built kiln. It is about twenty-five feet wide—clear, inside. The furnaces extend from inside, out about five feet. When I start to "water-smoke" a kiln, I get green wood, so that the fire will burn slow, my kiln being set loose at the bottom a draft is soon started. I occasionally shove brands and coals of fire back, but I am very careful not to raise a greater heat than will boil water, until the water smoke flies off light all over top of kiln. When the water smoke begins rapidly to disappear, I increase the heat in furnaces and *arches* gradually, until the same degree of heat appears on top of the kiln that is seen in the arches. Now I increase the heat to all the clay will stand without melting. By this time, you see, the kiln having been set looser at bottom than

at top, the draft is quick and strong, and the heat escapes up and throughout the kiln as fast as it is generated; so that in a short time the heat at top of kiln is as great as at the bottom. As soon as I see a place on top of the kiln begin to settle, I cover that with fine damp clay or loam, so that no draft of heat can come out at that place, thus preventing that spot from being too much burned and at the same time forcing the draft to other parts of the kiln when most needed; and so I proceed to fire and cover the kilns until the whole is covered over. As the kiln is covered of course the draft is diminished, and the consump-



W. R. MARTIN, SEC'Y THE HENRY MARTIN BRICK MACHINE MFG. CO., LANCASTER, PA.

tion of fuel is lessened, though the heat in kiln is the same, and is "thoroughly" diffused, and all parts of the kiln burned alike, except a few at the corners, and at the very top. After the kiln is "closed" I let it cool very slowly. It takes as long to cool off as to burn, and no cold air should be let in the kiln until a brick can be taken out at top by the hand. Now I have told you how we burn brick "thoroughly." The covering of the kiln with fine clay, is one of the secrets of our success. The heat is kept in the kiln by this means, so that the brick have time to get cool without sudden contraction of the surface; thereby preserving the solidity and

making the brick tough. You moderns call it "annealing." You will ask perhaps, have I come to make the great improvement in setting and burning brick. Well, I'll tell you. The Shemites that come out here were poor brick makers. They set their kilns tight at the bottom and loose above, we saw that was wrong, and we always cure wrongs by turning them right over, so they will act exactly the opposite way. You moderns have things you call science and philosophy, we had nothing but "born" common sense." I was about to thank the ghost for his valuable lesson, but he said: "No, all I ask is, for you to practice this lost art of "burning brick thoroughly." You will need them in your great and progressive country to use for better purposes than we did when we built the useless tower of Babel," and the ghost vanished as I awoke, determined to take his advice and follow his plan for setting and burning brick, which I have done the last forty years, and at no time or place have I failed to "burn brick thoroughly."

I notice in Clay Journals that since my sixth article on annealing brick, in CLAY WORKER published over two years ago, and republished in my book on "Brick-making and Burning," that several writers, speak glibly of annealing brick, and seem to want it understood that they had just made the important discovery that BRICK, LIKE IRON, CAN BE ANNEALED.

I dislike to have to allude to myself in matters that are personal. I would not notice innocent, ignorant plagiarism, when it may be fairly thought and

said, that the writer was too ignorant of current literature to know when he did steal. I have used the annealing process in brick burning, now since forty years past. I am indebted to none but the ghost above introduced, for my idea of annealing, or setting and burning brick. If any one will produce any well and properly authenticated, published evidence of priority in any improvements I claim to have made in the art of brickmaking and burning, I will step out and behind my superior with all the grace I can command; but until then, I must hold in contempt those who seem to ignore the owner of brains through mere inadvertance.

DOWN DRAFT KILNS.

I do not desire to criticise the argument for down draft kilns, but I think that the idea and need for them came from the fact, that the old universal error of setting brick tight, in the arches of kilns, or as I have above described, was not discovered to be the cause of imperfect burning near the top of kilns; and so instead of reversing the old mode of setting, it would be best to reverse the mode of firing. I do not pretend to understand how down draft kilns are worked, but from the information I get from the inventor's plans and general descriptions, I cannot see where the gain is had over a well built open top, up draft kiln. After all, it is simply a question of combustion of fuel, and the equal distribution of heat in the most economical way. Some writers and patentees claim, that fifty and even seventy-five per cent. in fuel is gained, by the use of their inventions. This means, that in or by all the old methods of burning most all the fuel is lost. A cord of wood or a ton of coal, with perfect combustion, will give a certain amount of heat, and all conditions and relations of the material to be heated, being equal, whether in an up or down draft kiln, the result will be the same. If an up draft kiln be properly built, the walls thick and hollow, as I have shown, and then my directions for setting and burning be strictly followed, the result in economy of fuel and perfect burning cannot be excelled. A strong draft through fine, loose fuel, with the heat confined and thoroughly diffused throughout the kiln, is the all important matter for the brick burner to consider. Whether up draft, down draft, or horizontal draft, these conditions in brick burning are of paramount necessity. I would advise all brickmakers to study, at least, chemistry enough to know what Hydrogen, Carbon and Oxygen means.

We talk about our great and grand discoveries and discoverers, but in my humble opinion, when Dr. Priestly discovered oxygen, he capped the climax of discovery, and stands pre-eminent as the greatest discoverer the world has ever produced.

Brother Brickmakers! Take a few doses of Bro. Waplington's chemistry medicine in CLAY WORKER. You will find it "mighty good," for foggy brains and empty pockets, and I trust, will not cause the "Bighead" in Bro. Waplington

or make him join the "*Mutual Admiration Society*."

Written for the Clay-Worker

THE TRIALS OF A BRICKMAKER.

No. 5.

"THE LABORER AND HIS HIRE."

THE brickyard office clock shows that in just five minutes more the engineer will first turn steam into the one o'clock whistle and then into the engine, when once more we are supposed to rattle out brick for the balance of the day at the rate of ten thousand per hour.

Everything has been working like a charm with us for the past two months, and resting upon the merits of a good dinner, we are happy as a clam in high water.

If we have any fuel bills that are over due, why let the other fellow worry? We have had trouble enough to get the coal and it will only even things up a little if he has some trouble getting his pay.

The shining of the sun overhead, would indicate that we were in favor with God, and the train of cars loaded with brick, that is just pulling out, shows that we are in favor with man.

Ah! just here we see a "Fly in our ointment," and feel a shiver of doubt go down our back-bone.

Furtively we cast our eyes out of the office door, instinctively looking for trouble, and sure enough, there it comes, in the shape of human discontent and plainly pictured upon the faces headed this way.

There are only a half-dozen of them, but what argues against their visit—meaning anything agreeable—is the fact that jointly they keep the clay upon the belt and which elevates the same to to the machine.

Nothing, however, like calmly meeting emergencies, and right here we wish to make the point, that, in our opinion, the emergency in the labor question often arises in the proper handling of the few, and at the right time, because only a half-dozen out of as many hundred come to you with "Blood in their eye." As far as brewing trouble is concerned, it is the height of poor generalship to treat that half-dozen with either contempt or brusqueness.

Realizing this fact, we cover our face with a smile, and brace our back against the safe door.

If the "Iron has to enter the soul" in a

labor conflict, it is full as well to let it get in by the back way, and to hide behind a good natured face.

As they file in the door, we take note that we have been just a little mistaken in the nationality of our workmen.

We had come to the conclusion without actual count, that over one hundred and fifty laborers came from one hundred and forty-nine different countries, and that the one hundred and fiftieth came from No Man's Land, and would go to No Man's hereafter. We now see that we were not exactly correct, for at least four of those that are entering are Canadian French, and that while the most of them cannot speak English, we know that some of them can, and therefore we send out a feeler with the remark, "Well, boys, are you here to find fault because the elevator does not keep you busy?"

A sickly smile goes round the crowd, while at the same time the constituted leader steps forward, and "opens the ball" by saying, that "The elevator is all right, but that they have come to the conclusion that their work is harder than on other parts of the yard, and they want more pay." Thinking we see a temporary shift from the difficulty, we say, "And if the work was no more than the rest do you would be satisfied, would you?"

"Why, yes," is replied in a hesitating manner. "Well, boys," we say, "then we will place one more man with you and see how that goes." Knowing what was in their minds, it was at least comical to note the expression of doubt on their faces, give place to wrath as they started for the door.

Once outside, a minutes consultation was held, and then the leader returned with the remark that, "it is ten cents more per day, or you can go to h——l with the belt."

Two minutes more and the whistle blows, and as we had concluded from the beginning, from watching their faces, what the result would be. our plans were already laid, and we said good naturedly, "Well, boys, come around Monday for your pay," and started briskly for the clay bank, where we kept mostly Italians. A minutes walk to it, where they had already assembled, and we march six of them to the elevator and with the blowing of the whistle, off starts the belt, and up goes the clay, as if no strike had occurred.

We have reported this small "Tale of Woe" because in it lies a moral, and

which is this: Do not employ all Canadian French on your works, or any one nationality. We have discovered in the course of a little experience that an Irishman and Darcy never agree, and that a Frenchman and an Italian are always spoiling for a fight with one another.

This fact of employing antagonistic sets of men, may not be an all sufficient panacea for labor troubles, but if you are in a condition to secure different classes, it will certainly place you in a condition where you can "Hold the Fort," where you might otherwise be routed, at least for a while.

Perhaps it does not speak well for our management of men, to be obliged to acknowledge strikes among them, but if you have escaped that kind of a trial it may be because of your better management of them, and then again it may be because you have that class of men who are not strikers.

Human faces differ, and so do human minds. I boldly make the assertion, that Western laborers, as a whole, are more intelligent on the average, than those in the East.

They are more reasonable because they are more intelligent, and they are more intelligent because there is a less percentage of the foreign element among them. Many Western laborers are the fairly well educated sons of Eastern farmers, but how is it with the laborers on our Eastern brickyards?

With an intelligent man one can always reason, and generally come to a satisfactory understanding, but how is it with an ignorant foreigner?

One day last summer, we came upon the yard a little after the one o'clock whistle had blown, and we met the foreman of the loading gang, who pointed to his twenty-five or thirty men and said; "Well, they have struck for more pay; what shall I do?" Telling him to hold our horse, we went and said to them, "Well, boys, we do not see how we can afford to pay any more than our competitors, because"—but there was no use to talk any further, because we had no listeners. They were already on the rail-road with their dinner pails in their hands, and headed for home. Can a man reason with another when that other won't listen to him?

The next morning when we came on the yard we were told that all the Italians were out on a strike.

Nothing, however, like having a little excitement.

Brickyard life is none of the liveliest anyhow, and if we cannot have a little pleasant diversion as often as we would like, let us occasionally have an unpleasant one.

On hunting for the Italian colony we find them "Non est." On trying to learn what caused them to "Vamoose the ranch," we find that the Italian boss had drawn his knife, and told every mother's son of them to "Git," and they got. When we asked what had "Stirred up his dander," we learned it was because we had told him the day before, that "He should no longer be steward," because he was an unjust one. We had found out that he made his fellow laborers pay him ten cents a day to hold down their job for them, and then let each one sit on that job about one-half the time, and hold it down at our expense.

Did he or the rest of them ever come back? Oh, yes. He came back that same day (in our absence), to our house, and left a dozen bottles of wine as a peace offering and bid for the old place, but we do not drink wine—when it is of poor quality, "and the place that knew him once shall know him no more forever." The rest of Italy's fair band made no "fly" bid for their old places, but the next morning when we looked into the pit, it was a caution to see how they were making the clay fly into the dump cart.

Fellow craftsmen, have you ever made brick south of Mason and Dixie's line? That part of our glorious country where men of color predominate; where the laborer is worthy of his hire, but where, when you hire one of them, you must expect to work a mighty sight harder than he does in trying to keep him at work.

If you have been a brickmaker in old Missouri, "I'll guarantee that you will agree with me in my assertion, that the Nigger's" business end is at the latter end of the day, and that he is always a hustler—when it is time to go home.

He is a great success at singing "I want to be an angel, and wid de angels stan," but occasionally you would like to have him be a brickmaker, and "make de bricks to stan."

Strike! Oh no; he is too lazy to strike. That is your part of the job, and although you may not always do it, I'll warrant you have often wanted to strike and kick too.

Don't confound the Southern darky with his Northern brother. They are

all ready to steal chickens; but while the one steals them for himself and Pickaninnies to eat, the other steals and sells the last mother's son of them. Are they all lazy? Oh no, but ours are like stars in the sky—plenty in sight, but mighty few at hand.

The laborer and his hire! What a trial to us all! How difficult to do without the first. How confoundedly difficult sometimes to provide for the latter.

One is sometimes inclined to cry out with Cowper:

"Oh, for a lodge in some vast wilderness,
Some contiguity of space, where rumor of oppression and deceit,
Of unsuccessful or successful war,
Might never reach me more."

Is there any remedy for the evil? Yes plenty of it. Where is it to be found? Ah, that's the secret. Just now we are not going to bother ourselves about that part, for we are not, at present, writing upon the Triumph, but rather The Trials of a Brickmaker.

Have you ever heard the song, "Some day, Some day, I know not when or where?" Well, perhaps some day we will take up and write upon the triumphant part of the brickmaking business, but just now we have tired out the readers and ourselves, and are going to quit and go to bed. Good Night.

J. A. S.

ARTIFICIAL RAIN.

Caused By Warm Air Currents From Brick Kilns.

Professor Chapin, in connection with other savants of the University at Athens, Ohio, says a correspondent of the *Cincinnati Enquirer*, has as a result of investigation reached the conclusion that the continuous and mysterious rain-fall that has for some weeks past invested a particular locality in this place with wide-spread public interest, is caused by a heated current of air from the kilns of brick plants here, flowing through a channel extending west from the kilns and becoming sufficiently condensed to cause the precipitation at the locality where the phenomenon is witnessed. A number of scientists from elsewhere who came here to investigate the matter concur with this solution of it.

HURT HIS FEELINGS.

"Well this is tough," exclaimed Jack Frost.

"What is?" asked the man in the moon.

"Here is a newspaper alluding to me as 'Jack the Nipper.'"

GLAZED AND ORNAMENTAL BRICK.

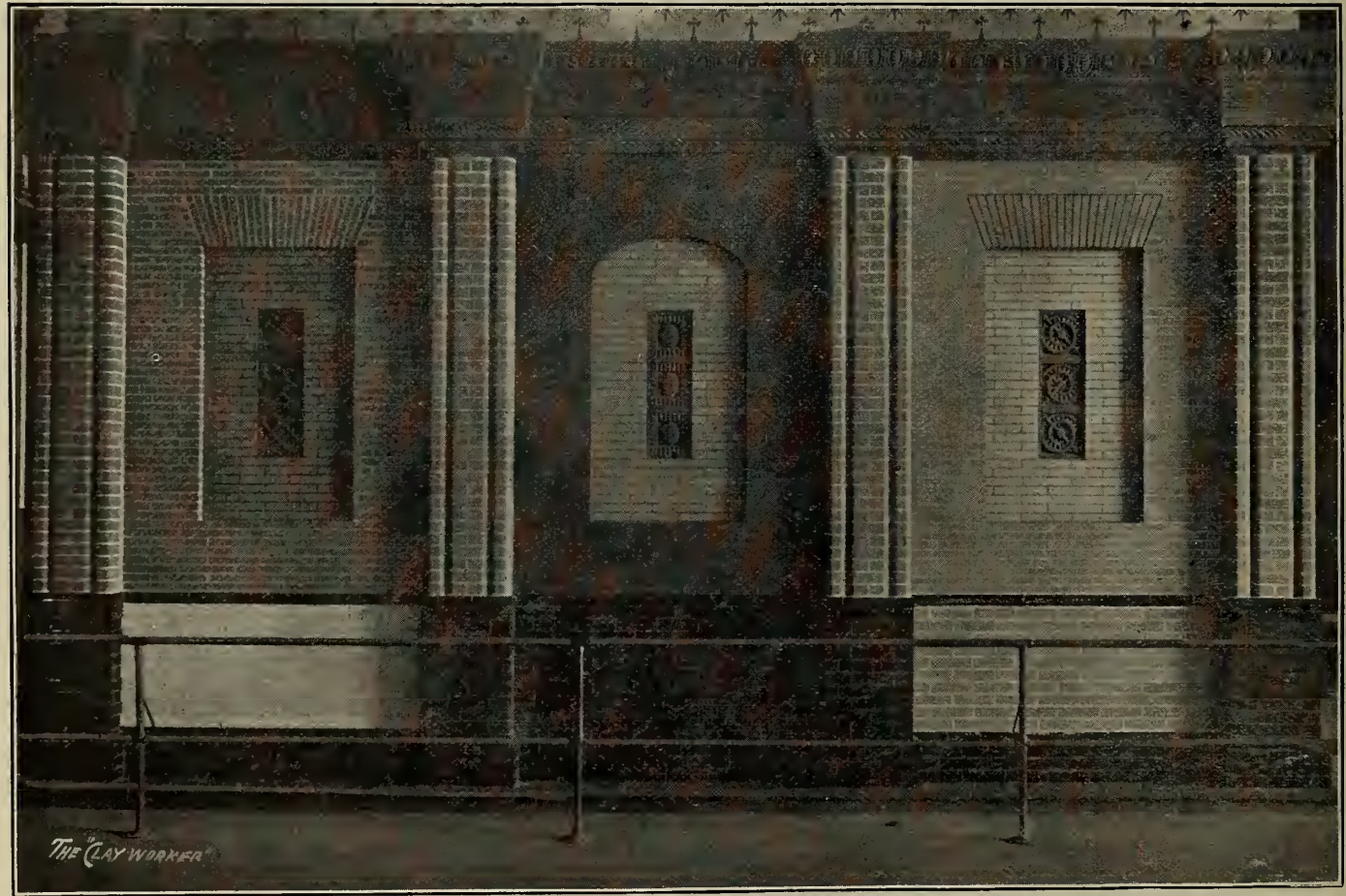
THE St. Louis Hydraulic Press Brick Co. made two very handsome exhibits of ornamental and enameled brick at the Exposition held in that city during Sept. and Oct., as our readers may see from the accompanying engravings which are made from photographs, kindly furnished by the Hydraulic Press Brick Co.

The exhibit shown on this page is simple in design but rich in color. The

are constructed of white enameled brick above the base are deserving of attention.

It represents what has been successfully accomplished by the dry press process, every brick shown having been made on the Hydraulic press. The capitals are a Blue Enamel, and made from a combination of three brick. The shelving is supported by a projecting brick in the columns, back of which is Buff Enamel and the whole would make a creditable display if the

The owners or representatives of said yards did not follow sudden impulses, but undertook to study the matter, visited some kilns which were in more or less successful operation here or abroad, and decided, finally, to build and operate. And in such cases the kilns are working to full satisfaction. The only difficulty is to receive full and true information. Very many of the parties, having met with success in continuous kilns, don't allow any stranger to look into the business, fearing, if



DISPLAY OF PRESSED AND ORNAMENTAL BRICK AT ST. LOUIS EXPOSITION.

base is built of Brown and Buff Enamel brick. The pilasters are a very dark grey. The panels are various colored Buff Roman, the center of each being three "10 x 10," made of the regular red St. Louis clay.

The cornice needs some study to appreciate, being formed of various kinds of molded brick, and shows what can be done in this line, in lieu of the galvanized iron so frequently used on brick buildings because it is cheaper.

The other display which is shown on the opposite page, is more pretentious and shows a more varied assortment of ornamental brick. The columns which

shelving and brick on it were taken away.

The whole was designed by talent in the employ of the company.

Written for the Clay-Worker.

CONTINUOUS KILNS.

Fourth Paper.

BUT on the other hand, we find in the United States several brick-makers, who found it advisable to build continuous kilns, made it a thorough success from the very start, and would, under no circumstances, go back to the old way of burning.

giving full particulars and facts, to meet with new competitors. But the truth cannot be hidden very long, and it remains only a question of a very short time, that continuous kilns, improvements on the original Hoffman, will be met with as frequently in this country as in Europe and Australia, as soon as the brickmakers take hold of them, and investigate the kiln at the proper place personally.

In Germany exists a similar organization to our "National Brick Manufacturers Association." It is the "German Association for the Manufacture of Brick, Clayware, Linie and Cement." The same

started several years ago with a "Fireman's school for 'Ringovens.'" in which school every brickmaker can take lessons, learning the advantages of the different systems of continuous kilns, the way to handle the same, and the best brickyards in that country open their doors to every well recommended man of the craft to study the art of handling those kilns.

It only remains now to mention another kind of continuous kilns, which seemed to be a new invention in 1872

which to run its cars, and that it was to be fired from top, like the "Hoffman kiln." Very soon two kilns of that kind were erected in the neighborhood, some others in different parts of Germany and Austria. It would take too much space to describe the same here again. One of these kilns, which I have seen, was in operation for several years, the other torn down after one season and a Hoffman kiln built from the remnants, using only the stack. As there was a certain limit for the size of cars, I be-

in most cases could only be removed after the fires were extinguished and the kiln cooled off. But I should not be surprised if some genius of those days would overcome the difficulties of the Tunnel kilns, which kilns would do away with all work and labor inside the kiln, hauling the brick directly from the yard through the kiln to the shipping place without unloading, setting and reloading, and which would be the ideal kiln of the brickmakers. But as long as this ideal kiln has not been in-



DISPLAY OF ENAMELED AND ORNAMENTAL BRICK AT ST. LOUIS EXPOSITION.

or '73, and which everyone interested in the progress of the art thought it would do away with the Hoffman principle entirely.

A friend of the writer, who in 1873 wanted to build a third continuous kiln in addition to those already built, brought, before commencing, a sketch of a new "Tunnel kiln" to my office. It was claimed as an invention of a young Swedish engineer I believe, by the name of Bock. It reminded me right away of the old French kiln, which I described on the first page of this series of articles. The only difference was, that this kiln had regular tracks on

lieve not more than 500 to 800 brick could be loaded on one, the tunnel could not be built long enough to hold sufficient cars to allow the brick sufficient time for water-smoking, burning and cooling. Therefore, no capacity worth mentioning could be reached. Water-smoking and cooling had to be limited to such a short time that nearly all brick came out shaky and crumbling, and a very inferior class of brick was produced. Besides that, sometimes the whole train in the tunnel could not be moved on account of broken brick falling between the platforms of the cars and the sides of the tunnel, which

vented, we are to see what improvements are made on the original Hoffman kiln, and judge for ourself *first*, which is the best one for our purpose, and *second*, does it pay, and is it wise to invest in such a kiln?

Answering the first question, we find the original Hoffman kiln as described above. Then we find the same kiln, with the same smoke-chamber, the same flues, but oblong, not round.

Further, there are kilns constructed the same way, having the smoke-stack outside. Other kilns are constructed having flues located under the bottom of the kiln, leading the results of com-

bustion from under the bottom of the kiln to the smoke-chambers. Others have two flues in each compartment, leading the heat to both sides of the interior of the kiln, and from those to the centrally located smoke-chambers. Another variety has no flues in the bottom, but extracts all gases through the top of the kiln to the smoke-chamber. Other kilns do away entirely with the smoke-chamber, and lead the products of combustion partly through the top and partly through the bottom of the kiln, by means of main flues, directly to the stack.

We can register all those kilns under, first, down draft kilns, second, up draft kilns, and third, up and down draft kilns. It is not my purpose to compare the value of the different kilns. I can only say that all of them in proper places, and handled well, give satisfaction. All other varieties in regard to construction seem to be less important.

In answer to the second question, it is a matter of figures. A good continuous kiln saves, no doubt, 80 per cent. of fuel, which means 80 per cent. of purchasing price, hauling, handling and firing. If well built and properly handled, no salmon brick, no arch brick, no bats turned out, *provided* good green brick are set. That is another big saving. The continuous kiln is not dependent upon wind and weather. Green hands are easy broken in to fire the same with success under the supervision necessary in every well arranged yard.

I believe in putting correct figures for all those savings, and comparing the same with the capital to be invested, the continuous kiln should be used in all localities where a regular established market exists for good hard brick, where builders are compelled to use only good brick, where low prices are to be faced, and where clay-banks can be found to justify the erection of brick works, which will be in operation for generations.

In conclusion, I would call the attention of the readers to the fact, that in Europe on places where four or more smaller yards with old kilns were operating, managed by parties of limited means, the same joined in coporation and built one continuous kiln in common, burning the outputs of their respective works in the same kiln.

AN OLD BRICKMAKER.

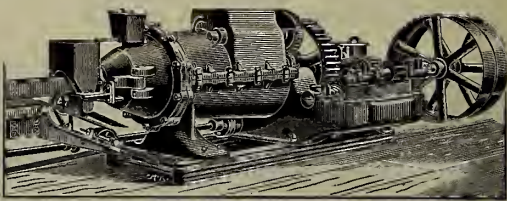
REPRESENTATIVE BRICK MACHINERY.

THE success of Penfield Modern Auger Brick Machinery has been so marked, even from its first introduction upon the market, and its use has become so general, that it will not be out of place to note in the columns of the CLAY-WORKER some of the distinguishing and advantageous features of this line of machinery, rendering it highly adapted to the requirements of experienced and progressive brickmakers.

To those not familiar with this class of machinery it may not be out of place to state that the main shaft of the machine, provided with suitable tempering knives and expressing auger, revolves in a cylindrical, tapering tub arranged with a die at the front end. The tapering shape of the tub tends to compress the clay as it is forced forward, making brick of the utmost density, which is especially desirable in the manufacture of paving brick. If end cut brick are to be produced, the outfit is equipped with an automatic sanding device, also automatic cutter and separator, so that after the clay is fed into the machine no further manual labor is required until the brick, automatically sanded, cut and separated, reach the end of the off-bearing belt, ready to be conveyed to the drying department. In many works the off-bearing belt is so

owing to the improved manner of construction. Each machine is self contained, and the back frame holding the bearings is a large, heavy casting, ensuring rigidity and rendering it impossible for the bearings to get out of line. The journals are all long and conveniently arranged for oiling. The gearing, of most approved pattern, is extra heavy and strong.

SUSTAINING THE END THRUST. — At



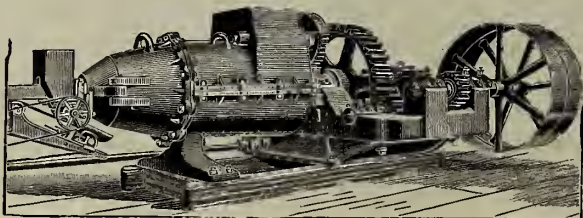
No. 10 PENFIELD AUGER MACHINE, SPUR GEARED.

the back of the main shaft are hard metal end thrust pieces, one interlocking and revolving with the shaft. These small parts receive all the wear from the end thrust, and can be replaced at slight expense.

The main shaft can be adjusted lengthwise, keeping the auger close to the surrounding case, and the machine up to its full capacity at all times.

The under half of the end thrust plate chamber forms an oil reservoir, providing means of lubricating the entire surface of the thrust plates continuously and thoroughly and reducing the wear and friction.

SPECIAL KNIVES AND AUGER.—The knives are wrought iron with steel edges. They can be removed without taking out the shaft, and can be adjusted to any required angle in order to secure the best possible results as to capacity, pugging, etc., in the particular grade of clay worked in it, or to compensate for wear of the knives. Thus, if considerable pugging is required, the knives can be arranged with a small amount of angle; if less pugging is needed, and the largest possible capacity desired, the problem is as readily solved by increasing the angle of the knives. It has also been found that some clays will feed forward much more rapidly than others; consequently this feature of Penfield Auger machines, permitting the necessary adjustment of knives to secure the best possible results in any clay, is a decided advantage which should not be overlooked by prospective purchasers of machinery.



PENFIELD No. 15 AUGER BRICK MACHINE.

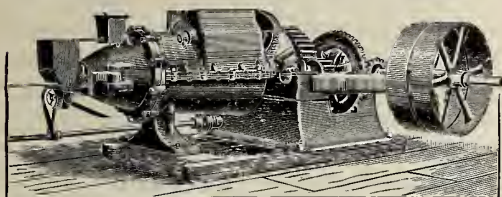
lengthened that the brick are delivered at a distant portion of the yard and adjacent to the dryer, ensuring added convenience and saving of labor.

Where the machines are arranged for side cut brick, a pallet-delivery cut off table is provided, which cuts a number of brick at each stroke of the lever and deposits them on boards.

As to the construction of the machines, they are built of the best of materials throughout, and in such generous proportions as to secure a surplus of strength. They are provided with the most approved methods of taking up the wear, which is never excessive,

The auger is made of extra hard, white metal, nicely ground and polished.

FEED ROLLER.—The Nos. 8, 10 and 15 machines are provided with feed rollers in the hopper, so arranged that this roller and the knives on the main shaft revolve toward each other, catching the clay between them and assisting in feeding it through the machine. This device prevents accumulation or loading up of the clay in the hopper and increases the capacity of the machine, especially in tough, lumpy or sticky clays, or

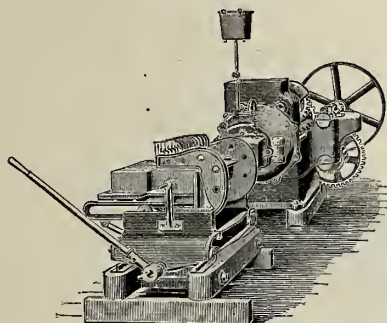


NO. 10 PENFIELD AUGER MACHINE, BEVEL GEARED.

those which would have a tendency to work back.

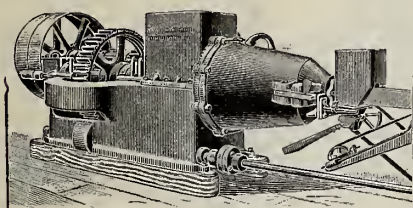
HINGED.—The front of the machine, containing the die is front hinged for convenience in cleaning or removing the die.

As this hinged die front sustains the



PENFIELD NO. 8 AUGER BRICK MACHINE.
Arranged for Side-Cut Brick.

direct end pressure of the clay, it is secured by a safety device, consisting of a link and pin. The pin, of common iron, is so cut away where the link engages it that in case the clay gets too dry, the pin will break, allowing the hinged front to swing open, obviating danger of breakage of the machine.



PENFIELD NO. 8 AUGER BRICK MACHINE.
Arranged for End-Cut Brick.

The Penfield Auger Machines are made in a variety of sizes, ranging in

capacity from 15,000 to 70,000 brick daily. The carefulness with which every detail has been worked out is certainly very creditable to the manufacturers, and the remarkable degree of success with which these machines have already met is sufficient guarantee of their still more widespread adoption in the near future. A significant fact is that the first users of this line of machinery are still among its firmest friends and staunchest supporters, while the later purchasers likewise rejoice in the selection they have made.

Any of our readers contemplating the addition of brick machinery will do well to communicate with Messrs. Penfield & Son., Willoughby, Ohio, who will furnish them full particulars and reading matter.

WORLD'S FAIR SOUVENIRS.

How You can Get One of the Columbian Half Dollars.

THE World's Fair souvenir coins are "going like hot cakes," and those who want to get one or more of them will have to bestir themselves or they will be too late. The desire for one of these mementos of the Exposition seems to be almost as universal as is the interest in the Exposition itself, and orders for them have been sent in from all parts of the United States and also from foreign countries.

This souvenir half dollar, it is reported from Washington, will be the most artistic coin ever issued from the mint. On the obverse side will appear the head of Columbus, designed from the Lotto portrait, and surrounding it the words, "World's Columbian Exposition, Chicago, 1892." On the reverse side will appear a caravel, representing Columbus' flag-ship, and beneath is two hemispheres. Above the caravel will be "United States of America," and beneath the hemispheres, "Columbian Half Dollar." There is no doubt that this coin will be regarded as the most distinctive and highest prized cheap souvenir of the World's Fair.

All of these souvenir coins, except five, are being sold at a uniform price of one dollar each. For the first coin struck off \$10,000 has already been offered, and various prices have been bid for the 400th, 1492d, 1892d and the last coin. Desiring that these souvenirs

be distributed as widely as possible among the people, and that all, irrespective of locality, have an equal chance to obtain them, the Exposition authorities have sought to prevent syndicates and others from purchasing large quantities and thus "cornering" the sale. On the contrary, they have arranged to supply banks, business houses and individuals in all parts of the country with as many as they may desire to distribute among their patrons, customers or friends. They require only that the orders must be for fifty coins, or some multiple of fifty, and that the order be accompanied by the cash, at the rate of one dollar for each coin. A great many banks and business firms have gladly complied with these conditions and ordered each from 50 to 20,000 of the coins.

Notwithstanding these conditions have been widely published, still a vast number of inquiries by letter has been received at Exposition headquarters asking how the coins may be obtained. The best way is to get them through local banks, all of which are no doubt willing to accommodate in this way their patrons and the residents of the city or town in which they are doing business. If, however, for any reason it is desired to obtain them otherwise, the proper method is to form a club of subscribers for fifty coins, or some multiple of fifty, and select some one member of the club to send on the order and money and to distribute the coins when received. Orders should be addressed to A. F. Seeberger, Treasurer World's Columbian Exposition, Chicago.

It is probable that the coins will not be ready for distribution until some time in December. But the orders are being sent in rapidly, and will be filled in the order of being received. Therefore it is important that all who desire coins should put in their orders as soon as possible.

BRICK BURNERS.

BRICKS in the kiln should not be allowed to chill through lack of attention during the night. When a kiln of bricks is allowed to chill they are more or less damaged, and, in large kilns, require twelve to twenty-four hours' hard firing to restore the heat that was lost; and every pound of fuel used during those hours of firing is fuel that could have been saved to burn another kiln. The importance of a night superintendent, or watchman, who will sleep in the day-time and keep wide awake every minute of the night-time, cannot be over-estimated.—*The British Clay-Worker.*

THE COLUMBIAN SPECIAL RE-PRESS

PROBABLY no branch of machinery for clay manipulation has received more attention during the last ten years than that devoted to the re-pressing the various forms and shapes of clay, and none, we believe, has shown a greater per cent. of improvement. From the very crudest method in vogue but a few years since, have been evolved the most scientific machinery, by which not only the quality of the brick is improved by fine finish and greater density, but large numbers are produced in a given time.

The invention and operation of a new machine for this purpose, the Columbian Special Automatic Power Re-press, shown in the accompanying cut and manufactured by Messrs. C. W. Raymond & Co., Dayton, Ohio, is of especial interest. It is of the same general appearance as their Columbian, well known to a majority of our readers, but much larger and heavier, containing many new points of inestimable value for its special use. To brick manufacturers in need of a high grade, high speed re-press of modern design, large capacity and great

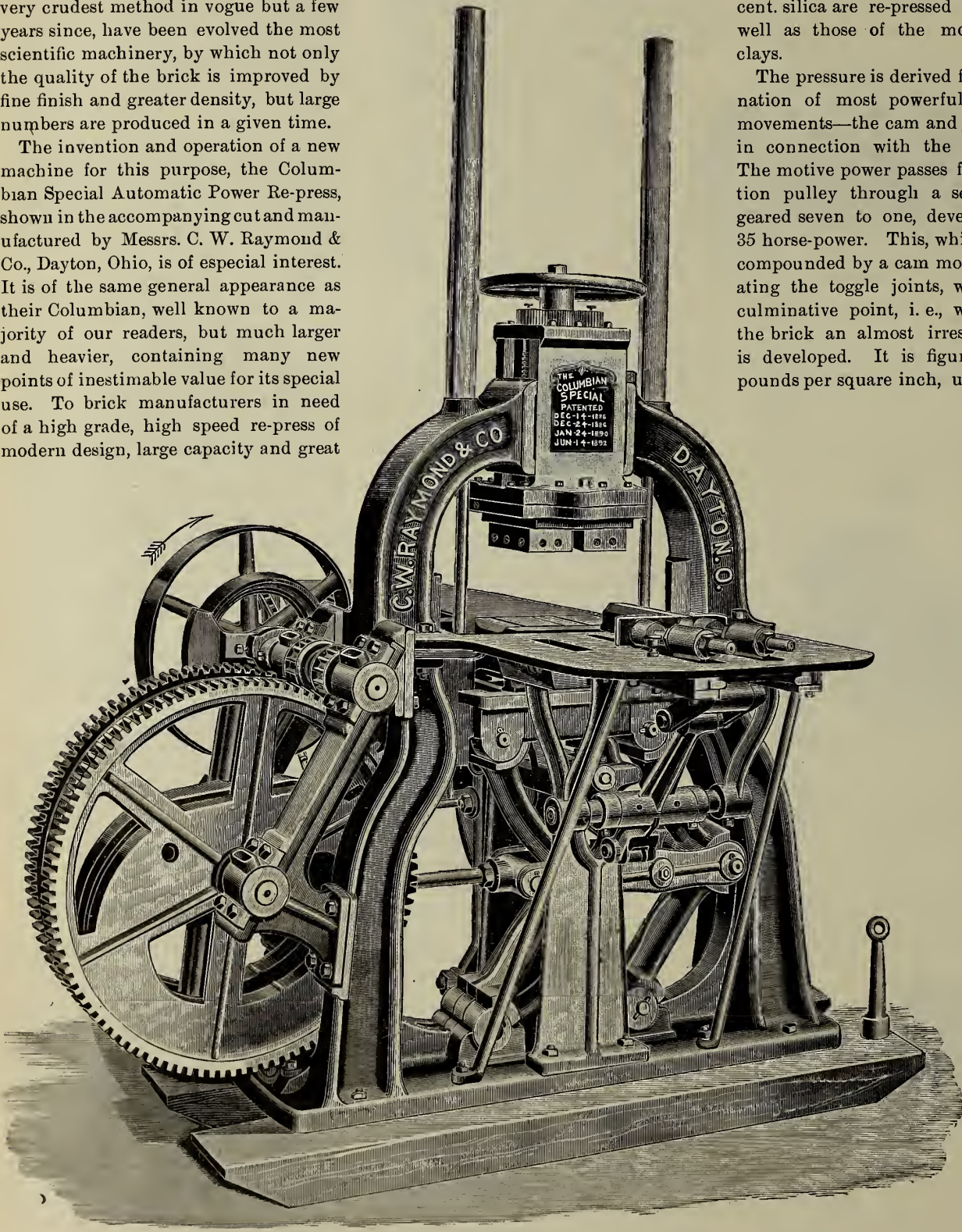
power, the Special cannot but command consideration.

The Columbian Special weighs nearly 8,000 pounds, all iron and steel. Its feed and delivery, both automatic, are positive. It has a 24x6 inch friction clutch driving pulley of improved pattern. Provision is made for taking up the wear at every vulnerable point.

Into its construction enters only the very best quality of material and highest class of workmanship.

Its feeding movement, placing the brick smoothly and gently on and into the compress box without jar or friction, is a triumph of mechanical skill. It protects all edges and handles its product so gently that brick 98.56 per cent. silica are re-pressed as easily and well as those of the most tenacious clays.

The pressure is derived from a combination of most powerful mechanical movements—the cam and gears working in connection with the toggle joint. The motive power passes from the friction pulley through a set of pinions geared seven to one, developing about 35 horse-power. This, which is further compounded by a cam movement, operating the toggle joints, when at their culminative point, i. e., when pressing the brick an almost irresistible power is developed. It is figured at 90,000 pounds per square inch, using a single



THE COLUMBIAN SPECIAL AUTOMATIC POWER RE-PRESS.

nine-inch die, or 45,000 pounds per square inch using a double one.

Its capacity is alone limited by the ability of the operators to handle the material and product. Experience has shown that from 10,000 to 12,000 large blocks, or from 20,000 to 25,000 bricks were about all the general run of pressmen could handle in one day. These figures, however, are sometimes greatly exceeded by experts, and are easily made on the press.

The toggle joint always rising to a fixed point, insure the bricks to be of uniform thickness. This thickness is instantly adjustable by turning the hand wheel at the top. The press will do equally as good work fast or slow, as it is built especially for high speed. The pressure remaining on the brick during nearly half a revolution of the pinion gears, gives ample time for the most intricate design to fill out.

The Columbian is usually placed near the brick machine belt, the clay worked as stiff as possible, and the brick repressed directly therefrom. In this way the press feeder is the only extra labor required and the only extra expense in making over common ones, the power required being nominal, about 3 horsepower. Some firms we know of estimate the cost of re-pressing their brick by this process as low as 12½ cents per thousand. The dies are all made self-lubricating, by either or both steam and oil.

The die, not forming the integral part of the press, can be removed and another substituted. They also being interchangeable, make it a universal press and adapted equally as well to red brick, fire brick, paving blocks, ornamentals, cupola blocks, or any other size or kind of plastic material in form as large as 13x16 inches.

Notwithstanding the capacity of the Special press, it is guaranteed at the conservative figure of 20,000 bricks per day. It will be seen from the subjoined statements from firms of recognized prominence that in most cases this number is largely exceeded.

WHAT USERS SAY.

LYNCHBURG, VA., October 31, 1892.

C. W. Raymond & Co., Dayton, Ohio.

GENTLEMEN:—We have your letter of the 23th inst, asking our opinion of the new double die Columbian Special Re-press. In reply we beg to say that the work of this machine is perfection itself. We are re-pressing without difficulty 26,000 paving blocks per day, employing for this purpose two men and three boys. We congratulate you on your success in producing such a perfect machine. Yours Very Truly,

VIRGINIA VIT. BRICK & SEWER PIPE CO.,

By J. G. Payne, Secretary.

CANTON, OHIO, November 5, 1892.

C. W. Raymond & Co., Dayton, Ohio,

GENTLEMEN:—We are making our Imperial Block on the double die Columbian Re-press, and we are pleased to say that it is doing its work even beyond our expectations. We are pressing brick at

the rate of 26,400 (10 hours run). The brick are pressed thoroughly and we cannot see wherein the machine could be improved. Certainly it does its work perfectly and is all that the Raymond Company claim. We are well pleased and commend it to any one requiring a re-press machine.

Very Respectfully,
THE IMPERIAL SHALE BRICK CO.,
By E. D. Keplinger, Sec'y & Treas.

Written for the Clay-Worker.

PRACTICAL POINTS ABOUT PAVING BRICK.

Seventh Paper.

By D. W. STOOKEY.

BRICK VS. WOODEN PAVEMENTS.

It may not be the manly thing to do to kick one who is down, but some who are down should never be allowed to rise again. This is not true of wooden pavements. They are sure to rise. Those who have laid them want them to rise after a few years to give place to something that will give better satisfaction.

Sometimes the generally conservative tendency of the people gives way, and they run after some new thing before they know as much about it as is to their advantage to know. This has been true of cedar block pavements. But "time will tell" and it is telling very much just now against them. One instance will be enough to show what they prove to be. Between the years 1882 and 1890 about thirty miles of cedar block pavements were laid in the streets and alleys of Springfield, Ills. S. A. Bullard, for several years city engineer, in a letter to the writer said: "We have a great deal of cedar blocks, laid in '83, '84, '85, '86 and '87. Much of the earliest laid is badly in need of repairs, being full of holes and rotten places, so that one has to pick his way in driving over it. The worst is not fit to repair and will have to be renewed at a very early date. Much of it is in the residence portion of the city, and it comes pretty hard on property owners to have to pave every six or eight years. As a result of our experience, our citizens are all against cedar block pavements, and the authorities are ordering brick pavement laid in all cases. * * * * It will not last more than six to ten years in our climate. It decays so that vehicles wear great holes in the pavement, whole blocks actually crumbling away under the wheels."

The material of which wooden block pavements are made is of itself sufficient guarantee that they will rot within a few years. The custom is to cut short

blocks from poles. A glance at the end of one of these blocks will show that nearly one-third of their sectional area is composed of sap wood. Many are cut from poor timber, dead trees, and timber that is unfit for anything else. These blocks necessarily vary greatly in durability, as some are green, some dead, some have knots, some are large and some small. As a natural consequence, some blocks rot within a very few years, thus making the pavement very uneven and full of holes.

The testimony given as to the durability of wooden pavements is not an isolated case, but is only an expression of the minds of all who have had experience with this material for street improvement.

THEIR RELATIVE DURABILITY.

When comparison is made between wooden and brick pavements, with reference to their relative durability, the disparity is so greatly in favor of brick that there may hardly be said to be any comparison between them.

Testimony in abundance, based upon actual experience and observation, places the limit of usefulness of wooden pavements at not over ten to twelve years, and to even reach this length, they must be assisted by more or less of repairs. Opinions as to the length of time that brick pavements may be relied upon to give satisfaction have repeatedly placed the limit at twenty-five years. This, however, is only an opinion and information as to its durability, where the limit has been reached, has not fallen under our notice.

Instances have been cited where the brick have served faithfully and well in America for sixteen years without any expense for repairs, and with no indications of giving away. On the contrary, they are said to be apparently in as good condition as when first laid. The authentic testimony of the use of brick pavements in the cities of Holland for a century are only in keeping with the natural inferences that might be drawn from the knowledge of the durability of burned clay which is practically without limit.

As a hard burned brick is not acted upon by moisture, frost, nor the acids met with in the street, it is to be expected that their durability will be very great, especially in streets of the residence portions of our cities.

When this is considered in connection with the experience related above with

cedar block pavements in the streets of Springfield, Ills., the superiority of brick is very evident, and even the most prejudiced minds could not fairly or reasonably contend longer for block pavements.

A VIRTUAL ACKNOWLEDGEMENT.

Various schemes have been offered to preserve the wood, such as the application of creosote, coal tar, pitch and other preparations, but of these Mr. J. H. Sargent, an eminent engineer of Cleveland, Ohio, said: "All the complicated patent arrangements and preservatives applied to the wood in pavements are worthless, and serve only to swell the cost."

The use of tar or any kind of preservative for wood is a virtual acknowledgement on the part of its friends that it is deficient in durability, and needs assistance from outside means. Tar is objectionable, because it becomes soft in summer, and cracks in winter.

The usual form of wooden pavements is made of short blocks, set on end. After these have been in use for some time, the sap wood, being softer and decaying more readily than the heart gives away. Being on the outside of the block it is still farther removed by chipping of the horse's shoes. After this wasting away of the outside of the block has continued for a time, the top of the block presents a rounded figure, highest in the middle. As the blocks are of all sizes, up to eight or ten inches in diameter, the worn surface presents an irregular and very unsatisfactory and wearying footing for horses.

(TO BE CONTINUED)

A CLAY-WORKER SCRIBE ABROAD.

FIRE PROOF CONSTRUCTION.

THERE is a law in Paris against fires; rather there is a law which renders destructive fires impossible. A mad rush through the streets to save property is rarely seen. When there is a fire it seldom or never gets outside of the apartment in which it originated. I noticed quite an excitement on the street one day and followed it up. Hose was attached to a hydrant and a number of men were straightening it out, others were carrying it up a stairway. The fire was in the sixth story and could not get out; it was confined. It was busily working on some bedding and the upper crust of woodwork of the floor, and there was danger that it might scorch

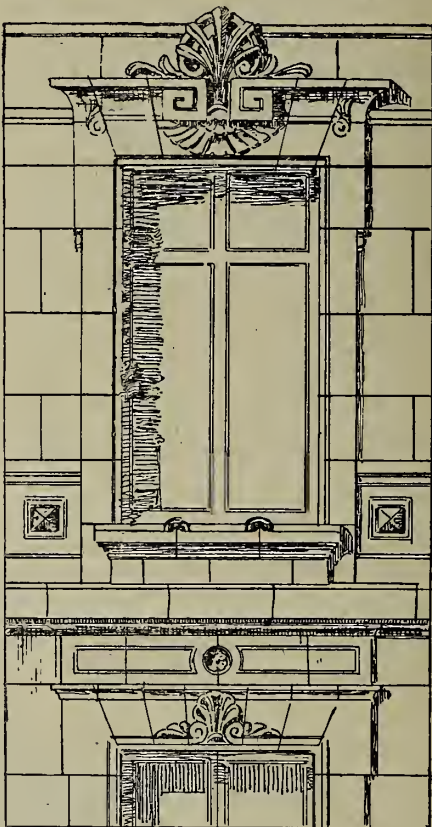
a door a window casing. However, as said before, a destructive fire is out of the question in Paris. Wood is so expensive that very little of it can be used. Floor joists are of iron. I-beams and the filling between them is of concrete or hollow tile. Most of the partitions inside of an apartment are of a plaster of paris composition. Walls of the kind are made, which, at times, are not more than three or four inches thick. The roofs are formed in the same way as the floor filling, though they have no upper covering of woodwork to correspond with the floor of a room. This sort of construction is compulsory, both from the general necessities of the case and from legal requirement, and is altogether a very happy state of affairs. One may retire at night in the sixth or seventh story of an apartment house with a feeling that his neighbor below or above may suffer the loss of his bed, a closet full of clothes or his floor and furniture, and yet he, not know of the trouble which has befallen them until morning, and then only by the confusion and dirt in the halls.

Improvements in the manufacture of clay products, their perfection and the reduction in their cost is bringing about a much better condition of things in America with respect to the construction of buildings.

The brick of Paris are of a most excellent quality. They are very hard and the material from which they are made partakes quite a little of the nature of fire clay. They are the same size of our brick and are hauled to the building in very heavy two wheeled carts. These carts are drawn by three splendid horses larger than are usually seen in America excepting the Norman exhibition stock. They are driven tandem. From the way the cart is constructed one would judge that it might weigh a little more than the load which it contains. The first time I saw one of these vehicles I could not but remark: "Two horses for the cart and one for the load." When the cart is dumped the quality of the brick shows. They have a bright, sharp ringing sound, which reminds one of a great crash of crockery ware.

One of the architects here tells me that the brick cost about \$6.00 a thousand and delivered at the building. On the same authority I state that bricklayers receive only a dollar and a half a day, and as food is higher here than in America it is not easy to understand how they live, unless it be that we un-

der-rate the nourishing quality of liquid excitement, which is the only cheap thing in France. All laborers work seven days in the week when sober, and, as a matter of fact, I have never seen any one who was under the influence of liquor, though I am told that they generally quit work at three or four o'clock Sunday afternoons, go to the cafes and do not show up for work until the afternoon Monday or Tuesday morning.



I give herewith a drawing of some French windows, and the surrounding stone work, which illustrates the theory which I have with respect to this stone construction of Paris, which I am quite certain is well adapted to execution in terra cotta. This is a drawing copied from a work on French construction, and is taken directly from the architect's drawings of a building here. So it is that the construction here shown is veritable excepting where I have made a change in the window-sill to show its adaption to a terra cotta form. I have also added a few horizontal joints, which occurs in the building, but which are not shown in the drawing which I copied.

All of this work could be done in terra cotta. The plain surfaces and blocks and the decorative parts according to the usual methods. I think a study of this question will open up a new field for clay work.

Machinery can readily be devised for

turning out the plain blocks and many of the decorative forms at a very low cost. The way in which terra cotta work is done adds very largely to its price, but with an increased product, and a larger volume of business, a more elaborate plant will be justifiable.

The machinery which makes the plain blocks can readily be made adjustable so as to work with a minimum expense of labor, the different sizes required. Work of this kind, together with the increased product of low cost, enameled brick would open up a field for clay work which, at this time, is hardly thought of.

Paris, France. L. H. GIBSON,



OFFICIAL ANNOUNCEMENT.

Seventh Annual Meeting of the National
Brick Manufacturers' Association,
To be held at Louisville, Ky.,
January 24 to 28, 1893.

To the Members of the N. B. M. A.:

GENTLEMEN:—As announced in the Official report of our last Convention, it has been determined to accept the cordial invitation extended by the Louisville Brick Manufacturers and hold the Seventh yearly meeting in that City, beginning Tuesday, January 24th, 1893, and continuing the balance of the week.

Reduced Railroad Rates have been applied for and in due time the necessary instructions for obtaining same will be announced, together with the arrangements for Hotel Accommodations, etc. The Louisville brethren are all actively interested and are going to do everything in their power to make the Convention one of the most successful yet held. The central location of Louisville and the fact that this is the second convention held south of the Ohio leads us to hope for a much larger attendance of Southern craftsmen than we have had since our memorable meeting at Memphis in 1888.

Indeed there is every reason to believe that the attendance from all sections will be unusually large, for with very

few exceptions the craftsmen throughout the land have had a prosperous season and the prospects are favorable for a continuance of this happy condition which, as nothing else can, will stimulate a universal desire for better knowledge of better methods by which better products may be produced in greater quantities at less expense. In brief, this is the object for which our Association was formed—the advancement of the material interests of the craft generally. This may best be accomplished by an exchange of experiences and opinions; and to this end every progressive brick manufacturer of America is earnestly invited to attend the coming convention and take an active part in the discussion of all practical questions that may be considered. An interesting and instructive programme is now being prepared and will be published with other particulars in the next issue of this journal.

Craftsmen desiring a copy of the Constitution and By-laws of the Association or the Official Report of the last annual meeting, can obtain same by addressing, the Corresponding Secretary, T. A. Randall, Indianapolis, Ind. The requisite of membership is an interest in the manufacture and use of brick and the payment of an annual fee of \$2.00. Craftsmen who are unable to attend the coming convention, but wish to identify themselves with the National Association and to secure a copy of the Official Report of the Louisville Convention, are requested to send their name and address to the Secretary for enrollment.

Respectfully,

THE EXECUTIVE COMMITTEE.

CHAS. B. PEARSON, *President*,
THEO. A. RANDALL, *Cor. Sec'y*.

SIGN THE PETITION.

A petition is in circulation asking Congress to reconsider its decision closing the World's Fair on Sundays. It should receive the signature of every one who has at heart the cause of good morals, the welfare of visitors to Chicago, and the success of the Exposition in the highest degree.

Bishop Henry C. Potter, of the Protestant Episcopal Diocese of New York, says that the Fair should be opened on Sundays. Bishop Potter is recognized as a type of the union of liberal ideas with profound sense of duty. He combines wisdom and conscientiousness. He knows the right thing to say, and he dares to say it. The memorable sermon

that he preached before President Harrison at the Washington Centennial three years ago established his place as a public teacher.

Bishop Potter says that the Fair should be opened on Sundays, and he adds impressiveness to the declaration by asserting that the action of Congress in the matter was probably expressive of the sentiment of the majority of the people of the United States. He proceeds in a most admirable demonstration of the proposition that this sentiment is founded upon a fallacy. "We shall get a good Sunday in America," he writes, "when men learn to recognize its meaning and its uses—not when we have closed all the doors which, if open, might help to teach them that lesson." Any door which will lead men to a deeper and broader understanding of the story of the world is a suitable door to open on Sunday. Such is the door of the library, the museum, the picture gallery.

All honor to Bishop Potter! Sign the petition!—*Ex.*

Written for the Clay-Worker.

CHEMISTRY FOR CLAYWORKERS.

Paper No. 7.

Having now furnished you with analysis for firebricks and a brickmaker let us see what may be deduced from them.

There is a widespread notion amongst clay workers and others, that the clay they handle and work into various forms is similar in composition with a large portion of their bodies.

The analysis of Prof. Lancaster and others, goes to prove that such is not the case, but far from it. There is practically *no clay* in man's composition. The solids given in the Professor's analysis only amount to about one-seventh of the weight of the body, the other six-sevenths are liquids and gases. The principal solids you see are carbon, lime, and phosphorus. These are never found to any great extent in clay, except the lime. When carbonate of lime is found associated with clays they are called *marls*. You can easily recognize a marl by the effervescence produced by pouring on it a few drops of hydrochloric acid, the carbonic acid of the carbonate of lime is driven out by the hydrochloric acid, and the rushing out of the carbonic acid is the cause of the commotion we call effervescing.

We will now leave man and his com-

position, and turn again to clay and its composition, remarking, however, that the cremation of man leaves only six or eight ounces of residue for the relatives to carry away, and the bulk of this residue is lime.

Fire clays are noted for the high percentage of silica they contain, and for the low percentage of potash, soda, lime and iron found in them. The lower the better, but of silica we may say, the higher the better for refractoriness. Look over the following analyses carefully and bear in mind that the quality of each lot was decided, not by the analysis, but by its life and endurance in the hottest part of the steel melting furnace:

	No. 2.	No. 3.	No. 4.
Silica	95.76	95.21	91.71
Alumina	.75	2.70	3.15
Peroxide of Iron	.44	.45	.67
Lime	2.66	1.46	2.63
Magnesia	.34	.23	.59
Alkalies	.06	.27	.43
Water	.15	.09	.62
	100.13	100.41	99.80

No. 2—Dinas Brick of good quality.

No. 3— " " not as good.

No. 4— " " very inferior.

These you will easily see, are what are known as silica bricks. The lime in some instances is intentionally put in to give cohesiveness to the brick, even then the corners may be crushed off with the finger and thumb, consequently they have to be handled very carefully, and not be used in any part of a furnace subject to heavy strains. These of course are not clay bricks, and it may appear foreign to the subject to introduce them here, but at the last convention of the N. B. M. A., the subject of sand in bricks, vitrification, etc., were discussed, and there appeared to be a misconception about the composition of pure clay. In the C. W. for October, I stated that all pure clays are essentially *silicates* of aluminum and assuming this to be correct, a brick made from *pure clay* and weighing four pounds when burnt, would have a composition of about two and one-half pounds of sand and about one and one-half pounds of alumina. We must therefore conclude that there is no such thing as a *clay brick* without sand, *per contra*, there may easily be a *sand brick* without clay, in fact, the late Sir W. C. Siemens made bricks for his regenerative furnace of pure quartz ground fine and cemented by a small percentage of lime.

The following six analyses of fire brick crucibles, etc., may be contemplated with pleasure and profit by those interested in such matters.

	1	2	3	4	5	6
Si O ₃	54.63	47.98	71.00	70.90	85.00	72.04
Al ₂ O ₃	40.27	46.94	23.00	24.80	11.33	18.79
Mg O	1.03	—	—	—	—	trace
Ca O	1.53	2.32	—	—	—	0.69
Fe ₂ O ₃	2.67	2.94	4.00	3.80	2.23	1.68
H ₂ O	—	—	—	—	—	6.70
	100.13	100.18	98.00	99.50	98.56	99.90

No. 1—English fire brick analyzed by Fresenius.

No. 2—The burnt clay contained in the brick.

No. 3—English crucible analyzed by Berthier.

No. 4—Hessian crucible analyzed by Berthier.

No. 5—Fire brick made of kaolin, occurring at Halle, analyzed by Wackenroder.

No. 6—Best Stourbridge fire clay by Buckmaster.

Stourbridge firebrick have enjoyed the enviable reputation of being the best and most refractory brick made in England, but within the last forty years a brick of higher refractoriness has been demanded and the Dinas brick was put on the market to supply that demand. Later on there came a demand for another kind of brick, necessitated by a method of steel making, known as the "*basic process*," this is a lime brick or rather a lime and magnesian brick made from a limestone known as dolomite, or magnesian limestone, composed of carbonate of calcium and carbonate of magnesium. Quite recently you no doubt read in the C. W. of sand bricks that were dried and burnt(?) by sprinkling them with cold water, these, of course, are artificial stones, and would bear lots of "slamming" together without being damaged to any considerable extent. We have then clay bricks of different grades and compositions, and we have lime and silica bricks with no clay in their compositions, but as I have shown above we cannot have clay bricks without a large percentage of sand or silica in their composition. Leaving for the present the lime and silica bricks, etc., and confining ourselves to clay goods, bricks stand first in the quantity of clay used and I think they stand first also in the width of range in composition of clays that can be used in their manufacture; their simple form and proportion materially assists in this, and here let us warn you against the deductions of non-practical brick manufacturers, or better non-practical clay workers, for what I am about to say applies equally to the manufacture of the finest pottery and the commonest bricks. Knowing the chemical composition of your clay and the properties it is *capable* of bestowing on your brick or your meat dish is only one half of the requirements to be fulfilled. When a brick, tile, or flower pot is molded, it has received its *form* only, it is formed, but not made. The moulding and spinning of clay goods is the chief mechanical operation they receive, but however cleverly this may be manipulated it is of no avail unless the subsequent operations of drying and burning be just as skillfully performed; therefore, do not ignore the *chemistry* of drying and burning, and above all, do not entertain the idea that the chemical properties of clay ware are the only ones for consideration, the mechanical properties, structure, etc., has an equal claim on your atten-

tion; paving bricks loose in structure would be unworthy of the name. To illustrate the necessity of due attention to the mechanical as well as the chemical properties of most substances let us take steel.

A good tool steel may have about seventy-five per cent. of combined carbon and would make a good reliable chipping chisel, but if all the care was exercised in giving it its seventy-five of carbon, it would be as worthless as a broken roofing tile, and as brittle. Only those who are conversant with the manufacture of cast steel have any idea of the utterly worthless character and appearance of a bar of fine Swedish iron when it has absorbed its complement of carbon which entitles it to be called steel; its surface is covered with blisters from the size of one's knuckles down to pin heads, and it is so brittle that throwing it down will often break it into several pieces, this is known to the trade as "blister steel," and to the novice appears to be a piece of iron with the goodness frizzled and burnt out of it, yet, the subsequent melting and hammering it receives, develops a hardness and a toughness almost incredible. This subsequent melting and hammering produces no change chemically, the change is a mechanical one. The structure of the blister steel is porous and coarse grained, or crystallized; the cast steel is dense and exceedingly fine grained, but the composition remains practically the same. Carrying the illustration still further: Your blacksmith makes you a chisel of this well worked—consequently good—steel, but he neglected to "temper" it and the consequence is that the edge turns up with less than half a dozen blows. This annoys you and you accuse your blacksmith of making you a chisel that is no good; this annoys him and he puts it in the fire with the determination that he will give it temper high enough this time, forgetting that he gave it none before; this time it is too hard and a large corner breaks off the first or second blow. Now such mistakes have condemned many a ton of good steel, but the point I am driving at is, that this tempering of steel is a mechanical process and does not change the chemical character of the steel one bit. These "too hard" and "too soft" properties were imparted to the steel by improper *mechanical* treatment, the chisel being a very good one after having its temper properly "drawn."

On the other hand, take a piece of the finest soft steel that is made, say with only ten per cent. of carbon in its composition, and the most careful treatment and skillful manipulation will fail to make anything like a good chisel, except in form; it is utterly worthless as a cutting tool, and all this difference in character or properties is due to the lack of sixty-five per cent. of carbon in the steel.

By this we learn how necessary it is for mechanical treatment and chemical

composition to go hand in hand in the manufacture of steel. Apply the rule now to the manufacture of clay goods and you will find it fits admirably. We might apply the rule to innumerable other branches of industry with the same result. I grant you that there has been, and is yet a large amount of clay goods made where chemistry is ignored, or *apparently* ignored, for when it is carefully looked into, we find that empirical or quack chemistry prevails; a kind of crude analysis is made with the five senses, or with four out of the five; clay is *looked at, felt, tasted, and smelled*, and from these tests some qualitative decision is arrived at, which the kiln very often ruthlessly sets aside, and plainly tells the clay worker—if he would only heed it properly—"that his senses are not the only *regents* he needs," they are all very well as far as they go, but his laboratory is woefully deficient with only them on the shelves.

The quackery of clayworking, and steel making, too, is being rapidly usurped by more rational and scientific methods, both chemically and mechanically.

Clay serves more purposes than the manufacture of bricks, tiles, sewer pipe and pottery, the well known substance, *alum*, is made from the alumina of clay. It is, however, of little importance in the manufacture of clay goods, but it plays an important part in the dyeing of the linen the clayworker wears, and is, I think, of sufficient interest to receive a brief notice while we are examining the chemistry of clay.

Common alum is not simply a sulphate of aluminum, but a sulphate of aluminum and potassium combined, and is made by boiling clay with strong sulphuric acid until the silicic hydrate, or sand is all precipitated, the liquid is sulphate of aluminum in solution, and if you add to this a solution of sulphate of potassium, and then allow the mixed liquids to evaporate, you will have crystals of common alum left. This is a simple way of making alum, but the general commercial way, is to use shale instead of ordinary clay, and the shale best for this purpose, is one that is abundantly impregnated with iron pyrites. Such a shale is generally called an alumschist. This abundance of iron pyrites would totally spoil the shale for the manufacture of paving bricks, or any other kind of brick for that matter, but it is just the thing for an alum factory, and must be treated accordingly. The shale is broken up into small pieces and piled into heaps which must be frequently sprinkled with water and left exposed to the air. While moist, it absorbs oxygen from the air and water rapidly, and this causes a rise in temperature which converts it into a mixture of iron and aluminum sulphates. You will observe that by this method we get sulphates without the direct use of sulphuric acid. All that we have to do is to supply it with water and let it have plenty of air. It will then make all the

sulphuric acid it needs and at the same time combine with the iron and aluminum, but we do not want a mixture of iron and aluminum sulphates; we want potassium instead of iron, so we must get rid of the iron. When the conversion of the shale has taken place, water is copiously poured on to it. This gives us the mixture in solution, that is, the mixed sulphates are dissolved and contained in this water, which is now concentrated by boiling, and then set aside to crystallize. Now the sulphate of aluminum is much more soluble than the sulphate of iron and the rule is, that the least soluble of two salts will crystallize first, and taking advantage of this fact enables us to separate a large portion of the sulphate of iron; this—as I have told you before—is "copperas" or "green vitriol," a useful and valuable salt of itself. There is, however, still some sulphate of iron left in the solution, which is separated by adding some chloride of potassium; this decomposes the sulphate of iron, the sulphuric acid going over to the potassium, forming sulphate of potassium, while the chloride combines with the iron, forming chloride of iron. The sulphate of potassium now unites with the sulphate of aluminum and this double compound separates as alum, while the chloride of iron remains in solution because it is the most soluble.

Iron pyrites in the older books is called "sulphuret" of iron, later on they called it "sulphide" of iron, now it is called "fersic sulphide," the formula of which is $(Fe S_2)$. The formula for the alum which we have just made from shale containing iron pyrites is: $Al K (SO_4)_2, 12H_2O$. This is potash alum, but there are other alums, these, and some of the uses of alum, I must reserve for my next paper.

WM. WAPLINGTON.

BRICK AND SAND GOOD ENOUGH.

THE Philadelphia Town Council is discussing the relative merits, of various paving material. Many are in favor of vitrified brick, but there is a division of opinion as to the most suitable foundation, some favoring concrete as being the most durable and satisfactory, while others are in favor of sand and a durable course of brick, as that method is so much less expensive. Speaking of paving brick, the *Public Ledger* says:

"It has been five years since this material was introduced into Philadelphia, and with scarcely one exception the streets paved then and since with it are in as good condition as when first put down, and these all have foundations of gravel or 'rotten rock' sand. It is nonsense to say that vitrified brick makes a bad pavement, for there is abundant proof that it compares favorably with any improved material now in use. In the large number of streets paved with it it may be possible to find here and there one which may not be first-class,

and some may be, even bad; but the same condition of affairs may be found on some streets paved with asphalt, Belgian block or any other material. Long tests in other cities in the United States, as well as that which has been given in Philadelphia, show that vitrified bricks make a handsome, good, smooth-driving and safe pavement for horses to travel over, as well as an enduring one, with the additional quality of being cheap, and no amount of abuse can alter these facts. The sub-committee should take a drive through the streets of Germantown as a preliminary step in the investigation."

WE CANNOT LIE

To or deceive you if you will act upon the following proposition.

In order to establish what we have said regarding our kilns, we anticipate filling, burning and emptying a kiln of tile, beginning about December 20, 1892, in the presence of prominent practical members of the craft, and request the presence of others, especially any who anticipate erecting kilns next season. Correspondence solicited.

STEWART BROTHERS.

Mt. Victory, Ohio

GIVE THANKS.

But a Thanksgiving dinner without good cooking is a hollow mockery. The Cincinnati, Hamilton & Dayton R. R. Co., whose dining-car service between Indianapolis and Cincinnati is famous for good cooking, have issued a special edition of the Martha Washington cook book, 320 pages, fully illustrated, which will be sent post-paid to any address on receipt of ten cents in stamps. This cook-book is the best in the market. The C., H. & D. is also the best road between Indianapolis and Cincinnati, with five trains a day each way, and chair cars on four of them. Send ten cents to E. O. McCormick, G. P. & T. Agt., Cincinnati, O., and get a cook-book free.

WHERE TO LOCATE NEW FACTORIES.

Is the title of a 150 page Pamphlet, recently published by the Passenger Department of the Illinois Central Railroad, and should be read by every Mechanic, Capitalist and Manufacturer. It describes in detail the manufacturing advantages of the principal cities and towns on the line of the Southern Division of the Illinois Central and the Louisville, New Orleans and Texas Railroads and indicates the character and amount of substantial aid each city or town is willing to contribute. It furnishes conclusive proof that the South possesses advantages for the establishment of every kind of factory working wool, cotton, wood or clay. For a free copy of this illustrated pamphlet address Mr. J. F. Merry, Assistant General Passenger Agent, I. C. R. R., Manchester, Iowa.

A SCRAP OF BRICK.

Or Mildness Not an Unsurmountable
Obstacle to Getting There or
Thereabouts.

A Tragietta in Three Acts and a Few
Spasms.

BY CHARLES LEDERER.

Particeps Criminis:

KUY YOODLE, } Travelling Salesman for
AUBREY GAUDIBOY, } opposition Brick
 } Concerns.

THE UNKNOWN } A mild-mannered
 } individual.

Sample Bricks, Lamp posts, Local Fog, Dis-
tant beauties (out of sight), etc., etc., etc.

SCENE: A deserted street in a deserted metropolis.

ACT I.

Enter The Unknown.

(Soliloquizes) Ah me, I'm glad I'm
through with that job of brick. What



ACT I.

is it that Shakespeare says? Yes
—"He hath a garden circum-
mur'd with brick, whose western
side is with a vineyard back'd"
—Well, I'm tired of everything
appertaining to brick, but I
wouldn't mind the vineyard—
especially if it had a winery
attached. But hark! I hear
footsteps, or heart-beats, or some-
thing.

(Enter K. Y. at l. u. c. and A. G.
at r. u. e.)

BOTH: Ah, here's Roxy, the chap that's
going to put up that 19-story apart-
ment building. I'll get the contract for the
brick. But, ah! there's that infernal
{ Kuy Yoodle, he'll try to get it too. I
{ Gaudiboy,
must circumvent him. I'll lay siege to
the moon calf, and snare the nimble
marmozet.

(They approach the unknown from either
side).

BOTH (speaking to the unknown): Kee-
yind saire, I pry thee, let me bring thee
where the cheap bricks grow. I'll show
thee a jay's nest, and instruct thee how
to clutch the lofty bargain cheap. I'll
bring thee the fruit of clustering brick
kilns and sometimes I'll get thee young
scamels from the rock. Wilt thou go
with me?

THE UNKNOWN: Ay, by me sooth,
but which one of you, fair sirs? Which
one?

BOTH SALESMAN: Me! Me! Only
me! With me brave sir!

(They grab for their victim who stoops to
conquer and the salesmen fall on each other.)

ACT II.

SAME SCENE.

(The Unknown seated between the two
combatants who fight above
him. The Unknown has
nothing to say, but the au-
thor regrets to state that most
of the language indulged in
by the two salesmen is unfit
for publication.)

KUY YOODLE: You
mis'rable goat-faced apol-
ogy for a ————!
Do you think that the
gentleman wants to buy
any of your maggot in-



ACT II.

festes, moth-eaten brick?
You're a ———— bloomin'
——— if you think you
can ————!!!!?!!!!

A GAUDIBOY: You yeller-
livered, blue-nosed mandril of
Patagonian extraction, I'm a
lop-eared ————

——— if I let you foist your
putty-made brick on this fine

gentleman, who sits between us in silent
disgust at your unseemly language.
You ————!!!!

(They cover the street with each other's
gore.)

ACT III.

(The two salesmen discovered rolling on
the pavement, they smite each other,—lan-
guage as before.)

THE UNKNOWN (slightly in the distance):
My friends, I regret that you should
maim yourselves under a misapprehen-
sion. I am not Mr. Roxy, but I am
J. Shinnington Smythers, agent for the
Ploddington Brickyards, and, an
hour ago, closed a contract with Mr
Roxy for all the brick he requires for
his 19-story building. Good day, gen-
tlemen, good day.

(Curtain, blue fire and Philadelphia music.)

A GOVERNMENT COMPLIMENT.

The Wellington Machine Company,
of Wellington, O., feel highly compli-
mented from the fact that they have
received a request from the Commis-
sioner of Patents, for a model of their
"Monarch" Brick Machine to be exhib-
ited at the World's Columbian Exposi-
tion.

In making the request, the Commis-
sioner states that it has
been selected as a ma-
chine marking a distinct
advance in the art, and il-
lustrating such an inven-
tion as should properly
be included in the pro-
posed Government ex-
hibit.

This machine is at-
tracting marked attention
on account of the high
performance of those that
have been used the past
two years, and give prom-
ise of being a wonderful



ACT III.

success. The Wellington Machine Company, who manufacture it, have already received orders for three of them for next season's delivery. It certainly shows excellence when purchasers will send in their orders six months in advance of the time they wish the machine.

CORRESPONDENCE.

THESE COLUMNS ARE OPEN TO ALL. THE FULL NAME AND ADDRESS IS REQUIRED BUT WILL NOT BE PUBLISHED EXCEPT WHEN PERMISSION IS GIVEN BY CORRESPONDENT. THOSE DESIRING TO COMMUNICATE PRIVATELY WITH ANY CORRESPONDENT WHOSE FULL NAME IS NOT GIVEN CAN DO SO BY ADDRESSING LETTERS CARE OF CLAY-WORKER.

A Question of Education.

Editor Clay-Worker:

The proposition to establish a training school for clayworkers has brought out some comments and criticisms favorable and otherwise. The writer appreciates the wit and humor, as well as the wisdom, displayed by the critics.

Ten years ago brickmakers might have accepted wit, humor or ridicule as an argument against this proposition; not so to-day. Assertions not backed by logical argument have no weight with the modern progressive brickmaker. My idea of a training school for clayworkers is not to "grind out" brickmakers like lawyers and doctors are turned out. I trust we can turn out better work than a majority of the law and medical schools do, although it is not impossible to take a boy or young man who is not a brickmaker and turn him out of such a school better equipped than the average brickmaker. We have schools of technology that turn out first-class mechanics and artisans in other lines, and it is not necessary for a boy to be a mechanic when he enters these schools.

While these ideas are practical, it is not just this plan that the writer has in view, but rather a training school where the practical brickmaker could finish his education and equip himself so as to make it possible for him to become, in time, a well rounded, full grown brickmaker. Most of us that manufacture brick have boys (if not, we ought to). We hope to give them a fair book education, and learn them to be practical brickmakers. These are the boys that should be given a chance in life and sent to a training school, and there learn to harmonize practical knowledge and scientific truths. They have been confined to one locality, one kind of clay, one kind of fuel and one process of manufacture. To these young men I would give the opportunity to equip

themselves for the accomplishment of greater things than their fathers have, and here it might be well to suggest that some of us veterans, who have grown bald and gray and wrinkled in the service, might have our ideas broadened and our hats made larger if we took a course in such a school. I fear, however, we veterans will never learn much more, except that which is mauled into our craniums at the National Brick Manufacturers annual conventions.

How many practical brickmakers and even brickyard superintendents could rise to the occasion if a customer should order a bill of octagon brick or circle brick 6 ft. 8 in. radius, arch brick for an arch 4 ft. 6 in. radius, or a brick for a round corner 3 in. radius, and make a drawing of each so that your foundryman could prepare an iron or brass pattern for you, or suppose you were called upon to prepare drawings for a dryer, or kiln, or a building, and make a bill of lumber and other material necessary for its construction; all who can, stand up. There is Eudaly, Purington, McCain, McAvoy, Adams, Blair, Fletcher, and two bald headed men, and Peter Simple and Tim Tinker. Well, you are all brick manufacturers, and know everything; please be seated in silence. The above questions are strictly practical, and do not touch scientific knowledge. We have to make at this day something more than rectangular cubes. Our patrons want their dwellings and business houses to be not only substantial and durable, but pleasing and symmetrical in appearance. They want corners square, octagonal, round and beaded. They want bay windows, and turrets, and graceful curves and arches, and must have bricks of various shapes and designs to fill these requirements. The strictly and exclusively rectangular brickmaker must take his place away back in the procession. All this belongs to the practical department of our business.

If scientific knowledge has helped to develop and cheapen and perfect the manufacture of iron and steel, why will it not do as much for the manufacture of clay products. There can be no good reason given why there cannot be a union of intelligent, practical and scientific knowledge that will benefit and elevate our calling. Seats of learning have benefitted all others; why should the manufacture of clay products be an exception? We have the CLAY-WORKER for those of us who are to old and feeble

to attend college; now let us give the young men a chance.

R. B. MORRISON.

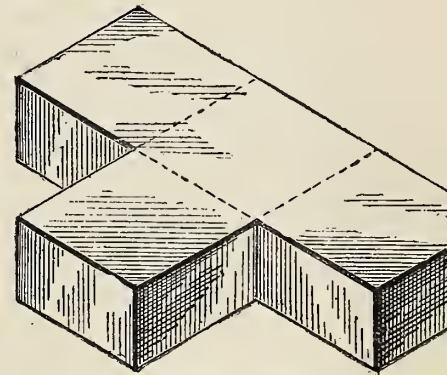
New Lock Joint Brick.

Editor Clay-Worker:

I have read with no little interest the instructive papers on "Bonds in Brick work," that appeared in the Sept. and Oct. issues of the CLAY-WORKER. It is an important subject, and one that has not been given sufficient consideration by American bricklayers and builders. In this connection I want to say a word of commendation for the CLAY-WORKER. You are doing good for the brickmaking craft by advocating better methods of laying brick as well as better methods of making them.

The better the brickwork the more general will become the use of the material we are making, especially in front and ornamental brickwork.

The writer has been working on the problem of



A NEW FORM OF BRICK

for several years and, I believe, to a very good purpose, as you may see from the accompanying sketches which show clearly some of the advantages gained by the Lock Joint Brick.

Fig. 1 shows the form of the brick. The Lock Joint Brick (see Fig. 1.) consists of four approximately equal rectangles, three of which are arranged side by side and attached edge to edge, the fourth being attached to the second. In practice each is equal to one-half a common brick, and may be increased or diminished to any size, adapting them to the various standards. It will be noticed that this brick will interlock with another of similar shape, or with a common brick in a great variety of ways, and that it is equal in volume to two common bricks.

Over a year ago I commenced my first practical tests, by making a mold and making brick by hand. Owing to

imperfect appliances, and not being able to get the necessary pressure on the bricks in the mold, a very large percentage cracked in the drying. However, the ones that dried without cracking were successfully burned with some common brick in the ordinary up-draft kiln.

My next experiment was made on the "Ohio" brick machine by having the

used to make the arches upon which were placed the lock-joint brick arranged stem up, then stem down alternately, and running across the kiln. This arrangement made another floor upon which the brick were similarly arranged, but running at right angles to the first. This plan was followed and kilns were filled and burned.

It was noticed that in burning the

bricks seemed to settle as one mass, and the loss in breakage in burning was scarcely two (2) per cent. This was considered an excellent showing, as our critics said the bricks could not be burned successfully, or at least profitably. The actual tests verified our most sanguine expectations.

From the lot of bricks thus made, the 22nd Ward school house, Pittsburgh was built by Messrs. Scott & Peoples, Architects, during the winter of '91-'92. This building has been visited by many people, and while the bricks were more or less rough and imperfect, yet the idea and system of masonry was carried out, and practically demonstrated to be a success, and as such endorsed by all architects and engineers who have examined it.

The writer then devoted his attention to the development of the various combinations in which the brick could be successfully and advantageously used. To show what has been accomplished, there has been prepared a 64-page manual containing sketches of many of the

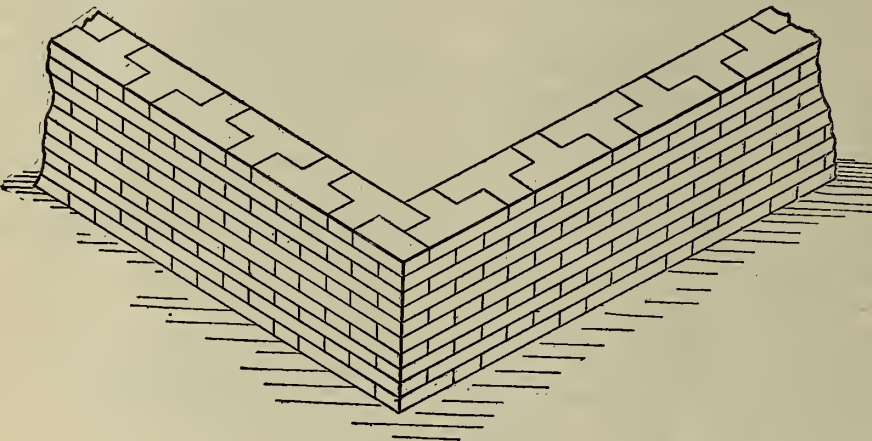


FIG. 2.—CHECKER FACE, 9-IN. WALL, COMMON BRICK USED ON CORNERS.

ie made the desired shape and proportion of parts. These brick were free from laminations, but were very rough as they were wire cut, and our cutting apparatus was very crude. However, the idea was fairly well represented, and in this manner enough brick were made to fill two kilns, which together had a capacity of over 300,000 common brick. The bricks as made were placed on their flat side on the common wooden pallets and dried by steam.

It was found that by this method the loss by cracking in drying was less than one per cent.

HOW THE BRICK ARE BURNED.

In burning, the common bricks were

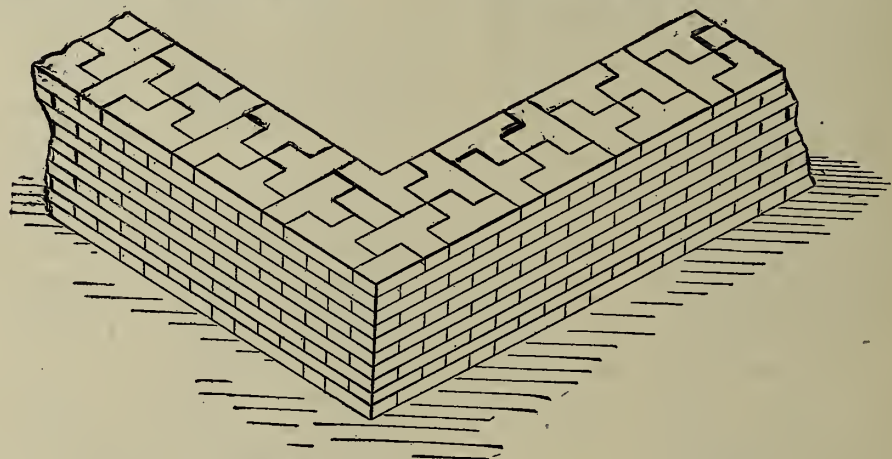


FIG. 4.—CHECKER FACE, 18-IN. WALL, COMMON BRICK ON CORNERS.

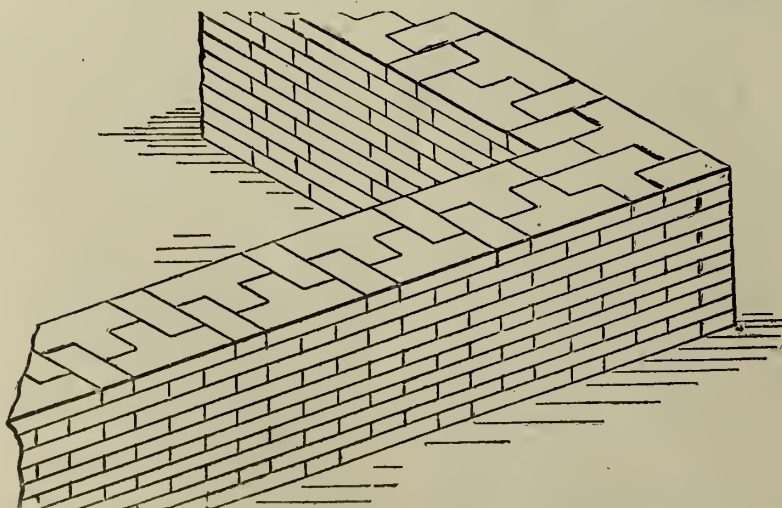


FIG. 3.—CHECKER FACE, 13-IN. WALL, COMMON BRICK ON CORNERS.

principal combinations, showing solid and ventilated work, together with description and other matter pertaining thereto, copy of which I will cheerfully mail to any of your readers.

At present writing no bricks are being made, but there is organizing a large stock company to manufacture the brick in large quantities.

There has been a great demand for this brick, such as to fully justify the work now under way.

It is intended to manufacture the brick on some good auger machine and then repress them on Raymond's Automatic Repress, a machine made to suit the work at hand. Steam dryers will be used, and bricks burned in some

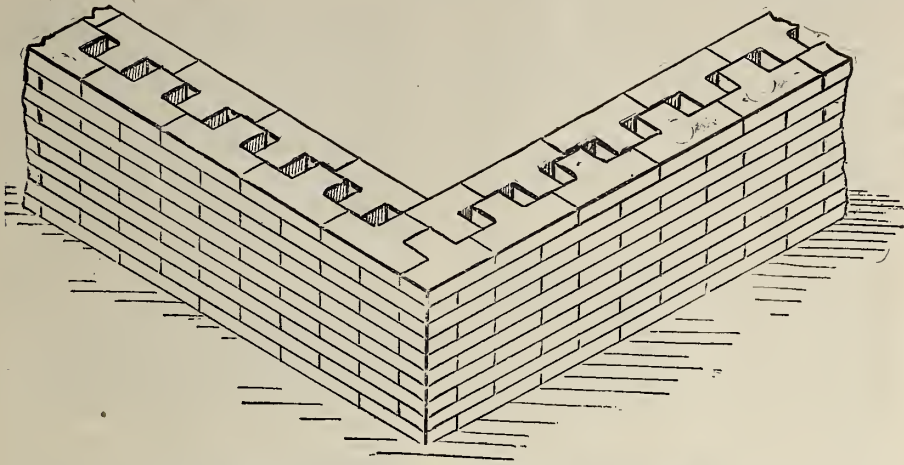


FIG. 6.—ROMAN FACE, 3-BRICK OR 13-IN. VENTILATED WALL.

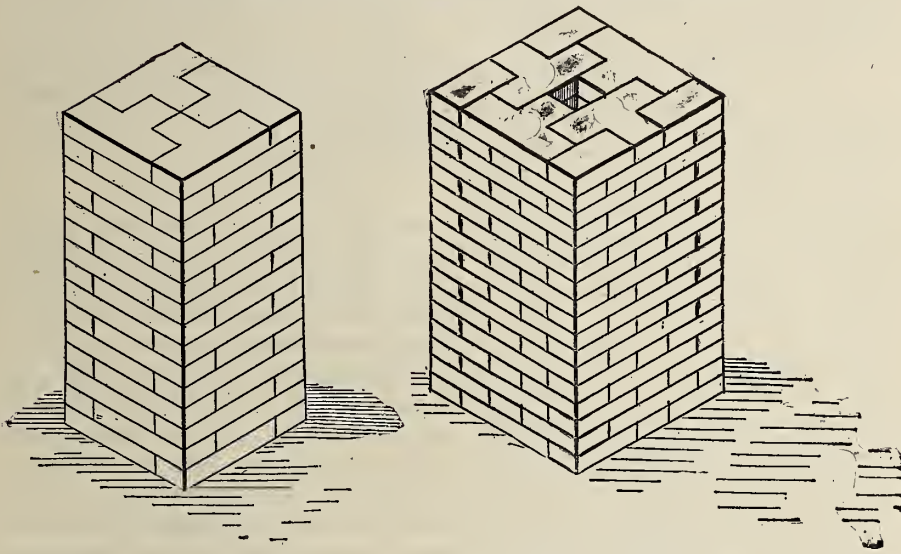


FIG. 7.—18-IN. PIER.

FIG. 8.—23-IN PIER.

good kiln that will burn in large quantities uniformly all hard bricks. I will be glad to furnish further information to those interested.

Pittsburg, Pa. GEO. E. BRIGGS,

The Village Brick Yard.

Editor *Clay-Worker*:

"BRICKLYN COLLEGE."

Our college now being named, the next thing to do is to set the foundation stones either on the "clay" or on the "rock," of which our modern brick-makers make money.

In looking over the subject to see if there is in the past any college with a history and purpose similar to ours, the village brickmaker recalls the memory of his Alma Mater, the Pennsylvania Agricultural College, known when first established as the Pennsylvania Farm School.

This school was established some thirty odd years ago, with the avowed object of taking the hard working

farmers' sons and giving them a scientific and practical education on all the points connected with the business, so that every farmer boy who graduated there might not only know how to do all the special kinds of farm labor, but also know why it was necessary to put potash on potatoes and salt on wheat, and then to keep a record of what he

did, that next year there might be a steady growth of methods as well as crops; and in these objects our college will occupy parallel lines.

Sometime in the 'Sixties a farm of 400 acres had been secured in a fertile, limestone valley, in Center county of aforesaid State, buildings erected to accommodate 300 students, a president chosen in the person of Evan Pugh, a farmer's son from the garden spot of Chester county, same State; who after study in the United States, had taken a course in Germany at their Industrial schools to especially qualify himself for this new work.

Doctor Pugh was not only a super-specimen of manhood, six feet three tall, and broadly developed, with the strength of a giant, but his head was fit to set on the shoulders of a king, a man of thirty-five, trained and selected for this especial work.

My advent to the college was about 1864, the institution had been running possibly ten years. We had 120 students, more or less. The institution was in fair financial condition, having the benefit of the United States land grant for the encouragement of Agriculture which Congress had been kind enough to grant the several states.

And here is the result: Among my boyish friends I was unable to find so much as one who was a farmer's son, but very many were farmer's grandsons, sent by their fond parents, with the

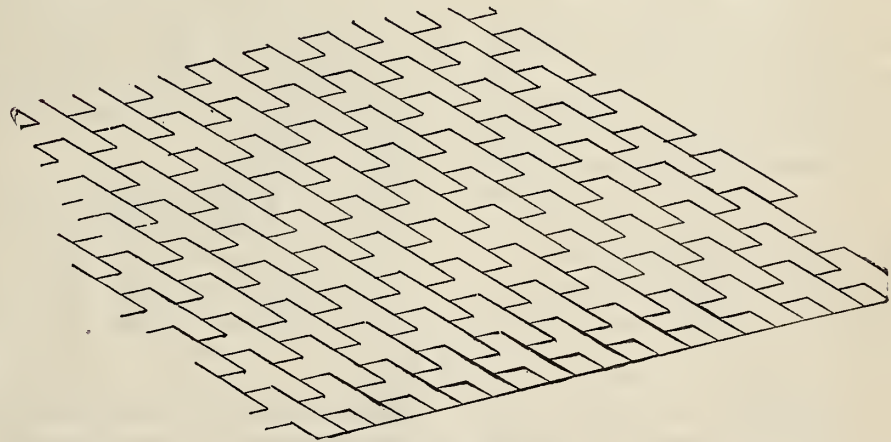


FIG. 9.—PAVING BRICK.

idea evidently, that the boys might have a taste of the old free life of the parents' boyhood days.

I had been a town-raised boy, who conceived the idea of being a practical farmer, and had, previously to the time named, hired out on several of the best managed farms in our own neighborhood, and then for advanced learning,

gone to the college to "top off."

Well I topped off in thirty days, and going to Doctor Pugh, told him that I had been grievously dissatisfied, that their college was incapable of practical work. How well I remember that he plead with me to stay on, saying that it was impossible for them to make farmers out of material that did not heartily and honestly love the work, and taking me by the hand, bid me "God Speed," and said he was almost completely discouraged at the outlook. He had given the best years of his life to prepare to teach, as the head of this institution, and now there was none left to so much as be willing to be taught. Dr. Pugh died within sixty days after this time, and I say of a broken heart; his idol shattered.

And now after thirty years the college still runs, but there is no more three hours farm work per day. That is all done by the hired men. There is still an Agricultural course advertised, but last year, though they have over 100 boys and girls, not so much as one of them took this course.

And this is the history of nearly, if not quite all the agricultural colleges of the several different states.

THE VILLAGE BRICKMAKER.

Philadelphia News.

Editor Clay-Worker:

If business in this city furnishes a fair index for the country, the situation at large must be in a prosperous condition. The mills are all running, labor is well employed, and all the surroundings point to increased trade. The building operations for this, the last end of the fall season, compares more than favorable with that of last year. There have been more large buildings, such as Hotels, Railroad Depots and public edifices in general erected. Indeed, it looks as though '92 will be a great year in point of general prosperity.

The Pennsylvania Railroad Company have commenced the erection of their new station at the north-east corner of Broad and Market streets. The building will have 57 feet frontage on Broad street, running to 15th street. It will be ten stories in height and built of brick and terra cotta. The building, when finished, will cost in the neighborhood of \$1,000,000.

BRICK PAVEMENTS.

The Committee on Highway of

Council have been investigating the various methods of street paving, etc and, of course, vitrified brick enters into the subject. From the condition of the streets which have been paved with vitrified brick in this city, the necessity of this investigation does not seem to exist.

It has been five years since this material was introduced into Philadelphia, and with no exception, the streets paved then and since with it, are in as good condition as when first put down, and these all have foundations of gravel or "rotten rock sand." It is very generally excepted that vitrified brick makes a good pavement even for heavy travel, for there is abundant proof that it compares favorably with any material now in use. It is not only a good pavement, but a handsome one as well. Long tests in other cities in the United States, as well as that which has been finished in Philadelphia, show that vitrified brick make a handsome, good, smooth-driving and safe pavement for horses to travel over, as well as an enduring one when properly laid, and a cheap road as well.

Brick manufacturers of this city are turning their attention southward. Orders have been placed with a number of our brick manufacturers for 6,000,000 bricks to be shipped to Cuba, and contracts have also been closed for as many more, to be delivered after the first batch has been shipped. Murrell Dobbins has booked one order for 1,000,000, and other firms that can ship by boat direct are also signing contracts. These large orders have been given by Cuban planters to erect buildings for molasses boiling.

The Peerless Brick Company have received the brick contracts for a store building at Georgetown, S. C., for D. J. Crowley, also the brick for a new school house at Bridgeton, N. J., also for the north-east elevation and lobby of the train shed of the Reading Terminal Station.

Brick manufacturer, William Conway, Democratic candidate for the Legislature in the nineteenth District, Twentieth Ward, has withdrawn from the contest, on account of the pressure of business which precludes his making an active canvass.

Wm. McLae has purchased the Morton Brickyard properties, containing ten acres of ground, for \$3,500. The yard has lately been operated by Benjamin

Morton, son of Hon. Sketchley Morton, a son of John Morton, one of the signers of the Declaration of Independence, and the one who gave the casting vote. This is a growing section of the country and as there is plenty of good clay in this vicinity, Mr. McLae's prospects are certainly of a bright order, particularly as he is a practical man.

The Jarden Brick Company has just secured a tract of 100 acres of clay land near 26th street and Point Breeze Ave. It is the intention of the company to double its capacity, making the total of the plant 300,000 brick daily.

The exports of brick the last week included, 235,000 brick shipped by Murrell Dobbins to Cuba. Mr. Dobbins has also contracted to serve 6,000,000 hard brick for sewer purposes in close proximity to his yard. Hard brick has been in good demand this year, but the prices continue entirely too low.

READY MADE MORTAR.

Master bricklayers and plasterers, by invitation, inspected the extensive plant of the Quaker City Mortar Co., at 23rd and Filbert streets, and witnessed the operation of making mortar by machinery and ready for delivering and use in any part of the country by cars, etc. Since April, 1891, the Warner process of making mortar has been in successful operation in Wilmington, Del., by the Charles Warren Co., whose works have been run to its full capacity, and determined to seek more extended field of operation. The Quaker City Co. was formed in this city with a capital of \$200,000. It is now in working order, and capable of turning out 500 or 600 tons of machine made mortar daily. The advantage claimed for the new process is, that there is no increased cost to the consumer, that mortar can be made at all seasons of the year, that cold weather will not interfere with the supply, that the lime is retained in bulk for a period sufficient to insure its gradual loss of heat, that its slow but thorough digestion insures homogeneity, and a putty-like consistency, and, finally, a material of extraordinary tensile strength and remarkable smoothness, with a freedom from stocks, stones or other foreign material.

The same is taken from boats at the company's wharf by an endless belt of small iron buckets and carried up to the top of one of the buildings, where it is dropped through screen chutes and falls into hoppers over the mixing

machines. The lime is slacked in large vaults on the first floor, with whatever water may be necessary, and pumped by steam to the same point, a workman regulates the proportion of sand, lime and water by valves upon the chutes over the mixers, in each of which two large rotary wheels revolve thoroughly assimilating the material etc.

The officers of the Quaker City Mortar Co., which is incorporated, are Pres. Wm. H. Albertson, a practical plasterer—closely identified with the business interests of this city; Vice-president Edward Tatnall Warner, also president of the Warner Process Mortar Co., of Wilmington, Del.; Sec'y and Treas. Ralph Peeverly, also of the Wilmington Co., and who are directors with the following gentlemen: Henry C. Butcher, Amos R. Little, Christian C. Febiger, Allen B. Rourke, John Atkinson, S. D. Warner, E. L. Hale and W. C. Strawbridge.

The new brick works, of the Philadelphia Brick Co., at Earnest Station, below Morristown, are rapidly growing up. Work has been progressing on them for several days, so that with favorable weather, they are expected to be completed shortly.

Ohio Valley News.

Editor Clay-Worker:

The volume of business with the sewer pipe works in this valley has never been equaled; but the various works have been seriously hampered by a car famine. The late cholera scare has shown many municipalities, the necessity of sewers thereby greatly increasing the demand for pipe.

Winfield Scott Hancock, a nephew of the late general, a civil engineer representing the District of Columbia, has been for the last two months stationed at New Cumberland, W. Va., inspecting paving brick made by the John Porter Co., to be used in Washington, City.

Mr. William Donaldson, another District Government Engineer, is inspecting sewer material made by Mc. Mahan, Porter & Co. of New Cumberland.

Having this material inspected before shipment is most satisfactory to the manufacturers, as it saves the paying of heavy freight rates on any material that might be condemned when inspected at its destination.

The sewer pipe manufacturers from

Ohio, West Virginia and Pennsylvania, 39 representatives in all, met at the Weddell House in Cleveland, October 18th. Their object being to discuss the condition of their business, and endeavor to so arrange matters as to make the traffic of sewer pipe once more profitable. They claim the business for the past year has been poor, beyond precedent, not in the demands, for that had far exceeded the supply. "Competition" said Mr. Hill, of the Hill Sewer Pipe Co., of Akron, Ohio, "has financially killed the industry. We have made lots of pipe this season, but we are selling our wares at cost and do not realize a shilling. It is not our intention to organize any sewer pipe trust." The meeting adjourned, having decided upon the advancement of prices.

The N. U. Walker Clay Mfg. Co., of Walker's Ohio, have recently resumed operation at their upper works, after an idleness of three years. This place was wrecked by the flood that swept Johnstown, and has never been repaired until this fall. They are having a great deal of difficulty in getting men to operate this plant, as there are very few clay workmen out of employment at present.

The output of the various sewer pipe works in this region is as follows:

The Forest City Sewer Pipe Works of Toronto, and the Great Western Fire Clay Co. ship each about thirty cars of pipe per week, the Ohio Valley Fire Clay Company ship about fifteen cars per week, and the Jefferson Fire Clay Co., about twenty cars per week. The Calumet and Excelsior Sewer Pipe Works of Calumet, Ohio, average about thirty and fifteen cars respectfully. The Empire Clay Works of Empire, Ohio, make their weekly shipments seldom fall below twenty cars.

BUCKEYE.

TIDINGS OF COMFORT AND JOY.

Our readers will find an unusually large number of new ad's in this issue. From past observations we know it is not necessary to extend a special invitation to inspect that department, for it is always scanned closely by all, but the display is particularly good this month. The CLAY-WORKER is prosperous and so are its many patrons. We may very fittingly call this a "Thanksgiving number." We, ourselves, are in a thankful frame of mind, notwithstanding the character of the "returns," which are

indeed overwhelming. At this writing the "returns" are not all in, but they are ample. We no longer need to stay down town and expose our delicate organism to the chilly night air, and we are thankful for that.

WORLD'S COLUMBIAN EXPOSITION DEDICATION.

One of the most important events of the year occurred October 19th, 20th and 21st, when the World's Fair buildings were dedicated. To the great credit of Chicago be it said that all the thousands who assembled within her gates to participate in the ceremonies or witness the demonstrations were amply cared for. None were turned away empty, but all were housed and fed comfortably and well. Chicago fully demonstrated her ability to care for all who may visit her during the World's Fair, for there were doubtless as many visitors there during the dedication as will be at any one time in '93. The affair has been fully described by the daily press throughout the world, and we take it for granted that our readers are fully informed of all that occurred. At any rate we cannot spare the space to give even a brief review of the many interesting sights. Suffice it to say here that Chicago acquitted herself with honor, and those who came from the borders of our great country doubting, as did some, as to Chicago's ability to build and conduct a great World's Exposition were fully satisfied, and returned to their homes enthusiastic in their praise of what has already been accomplished, and prophesying that the Chicago's World's Fair will surpass anything of the kind in the world's history. So mote it be.

A SMALL MATTER.

'Tis said a woman's letter is never complete without a postscript. However that may be, we know that many of our readers could make their letters to our advertisers much more satisfactory by adding this short postscript—The CLAY-WORKER. No explanation will be necessary. Just say: "P. S.—The CLAY-WORKER," and they will understand and thank you for the information, as they like to know the source of inquiries.

TOPSY-TURVY.

Two people in a hammock
Attempted to kiss
And in less than a jiffy
They looked like this.

THE CLAY-WORKER.

OFFICIAL ORGAN OF THE NATIONAL BRICK MANUFACTURERS' ASSOCIATION OF THE UNITED STATES OF AMERICA.

PUBLISHED MONTHLY.

Indianapolis, November 15, 1892.

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Ten copies	- - - - -	15.00

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ADVERTISING RATES furnished upon application.

Correspondence on all subjects of interest to Clay Workers is solicited. Communications from practical men will always be welcome. Address all communications to

T. A. RANDALL & CO.,

81 Massachusetts Ave. Indianapolis

THANKSGIVING.

Before the issue of another number of the CLAY-WORKER our Nation will have passed through the annual thanksgiving festivals and everybody who observes it, even in its lowest form, will be the better for it. As a day of festivities and family reunions it is a blessing, though the primary thought of thanksgiving to the All Father is only secondary in consideration, if at all, and we regard the increasing observance of the day in its several features as one of the good signs of the times. But the holiday feature and even the extra alms-giving of thanksgiving day must not push the original purpose entirely aside. We have abundant occasion, both as individuals and as a Nation, to be thankful for unnumbered blessings, and the cultivation of a thankful spirit brings a rich reward. Whoever looks only at the dark side of life fails to enjoy a thousand rays of sunlight which are scattered profusely all around, and few are so burdened with sorrow that they may not find frequent occasions for joy if they look for them.

As a Nation we have abundant reasons for gratitude. We are at peace with the world and our National honor has been maintained, notwithstanding at times there were complications, which, in other ages, might have been settled only by the arbitrament of the sword. It has been a year of general health, though pestilence at one time seemed to be im-

minent, and as to material prosperity no Nation has ever been more prosperous, and no year of our prosperous history has ever shown more signs of material development and success. The fields have yielded abundantly, and every branch of industry has alike rewarded the wage earner and the capitalist, so that we may say, not in the spirit of boasting but in the spirit of thanksgiving, that in no other country on earth are there as many comfortable homes among sixty millions of people, as in this America of ours. If it were allowable to come from this general view of occasion for thanksgiving to the personal interests of the readers of our paper, we could easily show that as an industry the workers in clay have never had greater occasion for thankfulness than now. The demand for our utmost output has been equal to the supply and prices have been such as to remunerate the manufacturer and to enable him to deal liberally with his employees. Let the day, when it comes, be observed by all. Let us not forget the family reunions, and our special thanksgivings, but let us also: "Enter into His gates with thanksgiving and into His Courts with praise, and be thankful unto Him and bless His name."

THE CONVENTION.

The next meeting of the National Association of Brick Manufacturers' to be held in Louisville, Ky., beginning Tuesday July 24th, is formally announced elsewhere in these columns. A large attendance is naturally expected. It is not to those who usually attend meetings of the association, that we now address ourselves. Those who have been regular attendants know full well the benefits to be derived from such gatherings. No other one thing has done more to advance the cause of brickmaking as a business, than has our National Association. It is this which has cleared the way and made rapid national progress possible.

It is relatively a short time since brickmaking was a road-side industry, carried on by clumsy, awkward methods. It could hardly be dignified as a business. Now, it is a great national industry, which calls for the best intelligence and the highest character of business ability. To those who have not attended these meetings we can only say that they have thus far denied themselves of much pleasure and great business advantage. As is known brick-

making has made wonderful strides the past decade. By attendance upon the Convention, one may become acquainted with the various methods employed and the minutiae necessary to bring one's business to the front. The meetings of the Association are educational in their character. They bring brickmaking knowledge up to date. Attendance or non-attendance represents the difference between standing still and keeping up with the procession. One cannot say truly that by merely reading the proceedings, they may know what is done by the Association to the same extent as by attendance. Far from it. What one hears in the Convention is more or less formal, but in little groups about the hotel and around the Convention hall, the social meetings which develop an interchange of experience, may be found such common, practical, every-day details as are necessary for the better development of brickmaker's art. This, when taken with the more formal Convention methods, develop a completeness and systematic whole, the results of which are apparent when we thoughtfully view the progress of the brickmaker's art.

Convention meetings take the place with business men and brickmakers generally, that other educational methods furnish in other callings. One may go to the Convention and acquaint himself of the best methods now in vogue. The Convention reports and the informal discussions which attend them, both in and out of the Convention hall, have saved, in the way of useless experiment, thousands of dollars to many brickmakers. Instead of developing slowly and having the same experiments worked out individually in as many yards, the members profit by one another's experiences and hence the Association is a National school in brickmaking. Reader, are you a member of the N. B. M. A.? If not, why not?

The mid-year meeting of the National Builders Association was held in Indianapolis October 17th and 18th. All of the directors were present. The meetings were presided over by President Anthony Ittner, of St. Louis, and much business of importance to the building crafts was transacted. The Indianapolis Builders' Exchange entertained the representatives of the national body in various ways, ending with a grand banquet.

COMMON BRICK.

Common brick of good color are made in this section, in the vicinity of Indianapolis, of a quality which, for the laying up of fronts, are not to be excelled. We are confirmed in this statement by one who has been an observer of brickmaking in many sections of this country and abroad as well. Indianapolis has never been a large market for pressed brick; the reason is that there is a quality of common brick of such color that there is really no great necessity for pressed brick. There is no demand for them on account of the splendid color and good texture of the brick as ordinarily made. It is true that not all of the brick of this section have the high quality which we have mentioned. Nevertheless, there are a number of yards which mould their brick in a peculiar sand, which, in their burning, develop a dark cherry red color. These brick, be it understood, do not have the uniform edges, the smooth shape, the regular form which belongs to pressed brick. Nevertheless, in the hands of skilled bricklayers, and with the joints particularly fitted to this kind of work, we have the results which are at every hand present. There is something about brick of this kind, something in the texture, the way in which they receive the light, that is not to be met with in a pressed brick. The pressed brick have the smooth surfaces, and all the neatness and elegance which goes with their laying, but in common brick like ours there is a richness, a lustrous quality, a velvety texture, in combination with the very dark rich red, which is not met with in other kinds of brick. This sort of brickmaking was originally developed through the character of the bricklaying of this section. Indianapolis is blest with several bricklayers who take unusual interest in the character of their work. One in particular, who set the pace several years ago, and now has ambitious rivals in this kind of work. The work was commenced several years ago with brick of an ordinary kind, of fair color and all that goes with it; they were carefully laid, and it was thought, after a while, that if the brick were a little better it would justify a higher degree of skill in laying, and so they were made. Now it is in this section that common brick are shipped to some extent to Chicago, Milwaukee, Cincinnati, and to other markets equally distant in their removal from this sec-

tion. It is interesting to give this narrative in that it develops what may be done through methods which have a homely origin. It is not usually expected that common brick will assume the high character which they have reached in this section.

THE BUILDERS' EXCHANGE.

The meeting of builders in a common location is only one of the advantages which accrue from other local organizations; however, it is not one to be overestimated. A carpenter may find his bricklayer or one to figure on brick work for him, without chasing all over town for him. He may go to the Builders' Exchange with the certainty that he may bring himself into ready communication with those engaged in the various branches of the builders work. In this there is a saving of money. All large towns, certainly all cities, should have a well organized Builders' Exchange. The experience in all cities has been probably the same as it has in this one. For the first year or two the real advantage is not fully developed. The habit of coming to the Exchange every day is not readily formed, but in a short time it becomes fixed and the habits of all members are understood, whether one is expected between certain hours, say between 11 and 12 in the morning, or, now that the hours of labor are shortened, from 5 to 6 in the evening, so one may be reasonably certain of seeing all of the sub-contractors who are engaged in the various branches of work, and thus the business of building is simplified.

Sioux City, Iowa, is surrounded by vast deposits of fine clay, which in time will prove a source of great wealth to the good people of that city. The *Journal* suggests that an exhibit of what can be made from the clay beds in Sioux City be made at the Corn Palace next year, or, in other words, it suggested that the Palace be made a combination corn and clay palace. It is its opinion that a beautiful building could be made with the exterior decorated either in whole or in part with terra cotta work, brick, pottery, tiling, etc., and that the Corn Palace idea be the interior decoration of the building.

Our Philadelphia correspondent writes that prices there have advanced \$1.00 on a thousand for common brick, and that another raise is probable.

EDITORIAL NOTES and CLIPPINGS.

AND MUD.

We're duly thankful that the rain
Has seen fit to retire,
Though we admit that, while 'twas here,
'Twas something to add mire.

Glassford, Ill., wants a brick manufactory.

San Antonio, Tex. is to have a \$100,000 pottery.

Wm. Crawford will make brick at Palestine, Tex.

A large pottery is to be established at Monmouth, Ill.

J. H. Percy will erect brick works at Cumberland, Md.

Geo. Robinson will enlarge his tile factory at Bellaire, O.

The Scranton Fire Brick Co. is going to enlarge its factory.

L. F. Fentress will go into the brick business at Norfolk, Va.

J. J. Cox will build a large brick plant near Preston, Ark.

THE CLAY-WORKER costs but \$2.00 a year IF PAID IN ADVANCE.

A large soft clay brick plant is to be established at Elwood, Ind.

C. C. Cubberly will make brick by machinery at Gallatin, Mo.

The Markle (O.) Fire Clay Co., will put in additional machinery.

Stout & Son, Ottawa Lake, Mich., will likely start a large tile factory.

P. J. Meyer and others will erect a \$30,000 brick plant at Elmira, N. Y.

The Western Pipe and Brick Co. Golden, Colo., will build a new dryer.

B. A. Knight is organizing a company, to establish brick works at Rockford, Ills.

The U. S. Brick Co., Zanesville, O., has been incorporated. Capital, \$25,000.

Brown Bros., Belle Isle, N. Y., will establish brick works near Pools Brook, N. Y.

The Industrial Brick Co., May's Landing, N. J., has been incorporated. Capital, \$100,000.

J. V. Smith, of Kokomo, Ind., contemplates starting a paving brick plant at Hartford City.

The West End Pottery Co., East Liverpool, Ohio, has been incorporated. Capital stock, \$42,000.

All users of appliances requiring Detachable Chain or Chain Belting of any style will be interested in the new lines
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ANTHONY ITTNER,

MANUFACTURER OF

ST. LOUIS AND BELLEVILLE PRESSED AND ORNAMENTAL BRICK.

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